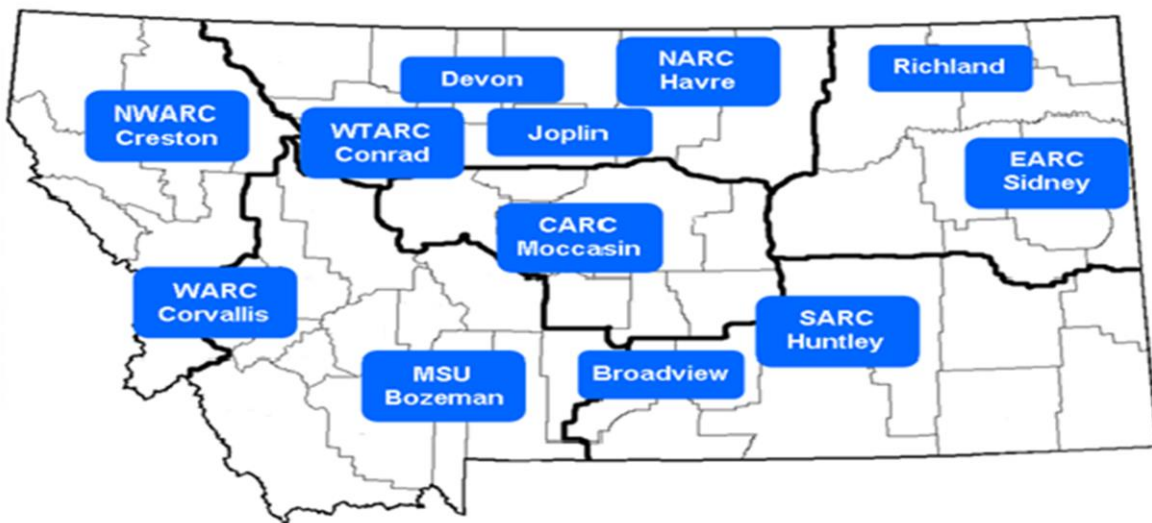


2016 Montana Cool-Season Spring Pulse Variety Evaluation Annual Report

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Table of Contents

| | |
|--|-----------|
| ACKNOWLEDGEMENT | 2 |
| LIST OF SEED SUPPLIERS | 4 |
| PROJECT DESCRIPTION AND OBJECTIVE | 6 |
| PROJECT DESCRIPTION..... | 6 |
| OBJECTIVE | 6 |
| METHODS | 7 |
| PROCEDURES AND EXPERIMENTAL DESIGN | 7 |
| COLLABORATORS AND EXPERIMENTAL LOCATIONS | 7 |
| SITE INFORMATION AND AGRONOMIC MANAGEMENT PRACTICES..... | 7 |
| <i>Precipitation</i> | 8 |
| <i>Agronomic practices</i> | 8 |
| RESULTS | 11 |
| DRY PEA | 11 |
| <i>Statewide Dry Pea Variety Evaluation</i> | 11 |
| <i>Multi-Year and Multi-Location Statewide Dry Pea Variety Evaluation Summary</i> | 25 |
| <i>Western Regional Dry Pea Variety Evaluation</i> | 32 |
| LENTIL | 35 |
| <i>Statewide Lentil Variety Evaluation</i> | 35 |
| <i>Multi-Year and Multi-Location Statewide Lentil Variety Evaluation Summary</i> | 42 |
| <i>Western Regional Lentil Variety Evaluation</i> | 45 |
| CHICKPEA | 47 |
| <i>Statewide Chickpea Variety Evaluation</i> | 47 |
| <i>Multi-Year and Multi-Location Statewide Chickpea Variety Evaluation Summary</i> | 49 |
| <i>Western Regional Chickpea Variety Evaluation</i> | 51 |
| FUTURE PLANS | 53 |

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List of Seed Suppliers

The lists of seed companies who submitted seeds for 2016 variety evaluation are shown in Table 1. The seed suppliers may be contacted if anyone is interested in getting seed or seed related information about the respective crops and varieties. This table is not exhaustive in listing seed suppliers for all varieties/entries evaluated in 2016 since most of the varieties received from breeders are not yet released (example Western Regional Variety Evaluation Trials) and lack of sufficient information.

Table 1. Some of the dry pea, lentil and chickpea varieties included in 2016 variety evaluation trials and seed suppliers

| Crop | Variety/Lines | Seed supplier | Seed cotyledon color |
|-------------|----------------------|--------------------------------|-----------------------------|
| Dry pea | AAC Carver | Meridian Seeds | Yellow |
| | AAC Lacombe | Seed Net | Yellow |
| | Abarth | Pulse USA | Yellow |
| | AC Agassiz | Meridian Seeds | Yellow |
| | AC Earlystar | Meridian Seeds | Yellow |
| | Aragorn | Pulse USA | Green |
| | Arcadia | Pulse USA | Green |
| | Banner | ProGene | Green |
| | Bridger | Great Northern Ag | Yellow |
| | CDC Amarillo | Meridian Seeds | Yellow |
| | CDC Meadow | University of Saskatchewan | Yellow |
| | CDC Patrick | Meridian Seeds | Green |
| | CDC Raezer | Meridian Seeds; Canterra Seeds | Green |
| | CDC Saffron | Meridian Seeds | Yellow |
| | CDC Treasure | Chahill Seeds | Yellow |
| | Cruiser | Used as check | Green |
| | Delta | Used as check | Yellow |
| | DS Admiral | Pulse USA | Yellow |
| | Durwood | Pulse USA | Yellow |
| | Ginny | ProGene | Green |
| | Greenwood | ProGene | Green |
| | Gunner | Great Northern Ag | Yellow |
| | Hampton | Chahill Seeds | Green |
| | Hyline | Great Northern Ag | Yellow |
| | Jetset | Meridian Seeds | Yellow |
| | K-2 | Pulse USA | Green |
| | Korando | Pulse USA | Yellow |
| | LN 1123 | Pulse USA | Green |
| | Majestic | Legume Logic | Yellow |
| | Majoret | Pulse USA | Green |
| | MP 1907 | Legume Logic | Yellow |
| | Mystique | Pulse USA | Yellow |
| | Navarro | Great Northern Ag | Yellow |
| Nette 2010 | Pulse USA | Yellow | |
| Salamanca | Great Northern Ag | Yellow | |
| Spider | Great Northern Ag | Yellow | |
| SW Marquee | Legume Logic | Yellow | |
| SW Midas | Pulse USA | Yellow | |
| Viper | Pulse USA | Green | |
| Lentil | CDC Maxim | Pulse USA | Small red |
| | CDC Invincible | Pulse USA | Small green |
| | CDC Imi-Green | Pulse USA | Medium green |
| Chickpea | CDC Orion | Meridian Seeds | Kabuli type |

PROJECT DESCRIPTION AND OBJECTIVE

Project Description

Cool season spring pulse crops (pea, lentil, and chickpea) production in Montana is increasing rapidly. In order to sustain these crops production, information on varietal testing and improved agronomic management practices are needed. Those results will provide unbiased information to stakeholders to increase yield and enhance crop diversification in the State. This will have substantial contribution to achieve economic, social, and environmental sustainability.

The Eastern Agricultural Research Center (EARC) of Montana State University (MSU) is currently coordinating a series of Statewide and Western Regional dry pea, lentil and chickpea variety evaluation trials across Montana. This project is designed to work together with pulse breeders and researchers from Montana State University, North Dakota State University, USDA-ARS Pullman, WA, Saskatchewan University, Canada, private seed companies and pulse growers. In 2016, the trials were conducted at seven Agricultural Research Centers and Bozeman Post Farm of MSU plus two cooperating producers' fields near Broadview and Richland, Montana. This annual report contains the results of those evaluations and summary from multiple years. The report is available to stakeholders free of charge to promote crop diversification and pulse production in Montana State.

Objective

The objective of these trials was to evaluate spring dry pea, lentil and chickpea commercial varieties and experimental lines for adaptability and yield potential across Montana State.

METHODS

Procedures and Experimental Design

The Eastern Agricultural Research Center invited individual private seed companies and breeders to submit varieties and entries of dry pea, lentil and chickpea for 2016 evaluation. Available locations for evaluations were indicated in the invitation letter. All sites were dry land except three irrigated sites (Corvallis, Huntley and Sidney). The Western Regional variety evaluations were organized by the breeders at Pullman, WA and Fargo, NDSU. The coordinating center treated all the seeds with fungicides (Apron MAXX[®]RTU, Syngenta Crop Protection, Inc.) to protect fungal diseases. Furthermore, the seeds were additionally treated with thiamethoxam insecticide (Cruiser MAXX[®], Syngenta Crop Protection, Inc.) to minimize pea leaf weevil damage. Seeds were packaged per plot at EARC, and shipped to testing sites together with appropriate rhizobium inoculant. The seed rates were 8, 12 and 5 live seeds per ft² for pea, lentil and chickpea, respectively. The experiments were carried out in randomized complete block design with four replications in most of the locations. Plot size varied from site to site depends on land availability and machinery used for seeding and harvesting. Best management practices were employed using available resources at each site. The researchers at the respective sites recorded plant density, plant height, days to flowering, grain yield, test weight, grain moisture content and thousand kernel weights for most of the sites and submitted the data to the coordinating office. In addition, the coordinating center received subsamples from the collaborators for further quality analysis. Grain yield data was adjusted to 13% moisture content before statistical analysis. Analysis of variance were done using GLM of SAS statistical package (SAS 9.4). The protected LSD ($\alpha = 0.05$) procedure was used to differentiate treatment means.

Collaborators and Experimental Locations

The type and number of these pulse crops and varieties evaluated at the different sites varied from site to site depending on the interest of seed suppliers and availability of resources at the respective sites. The collaborating research sites, location and type of crop they evaluated in 2016 are shown in Table 2.

Site Information and Agronomic Management Practices

Precipitation, site information and agronomic management practices for the respective sites are summarized in Tables 3 and 4.

Table 2. Summary table showing collaborators and locations participated in 2016 spring pulse variety evaluation trials.

| Collaborators [†] | Location | Conditions | Pea | Lentil | Chickpea | Observations |
|----------------------------|-----------|------------|-----|--------|----------|--------------|
| CARC | Moccasin | Dry land | X | X | X | |
| EARC | Richland | Dry land | X | X | X | |
| EARC | Sidney | Irrigated | X | X | X | |
| EARC | Sidney | Dry land | X | X | X | |
| LRES | Bozeman | Dry land | X | X | | |
| NARC | Havre | Dry land | X | X | | |
| NWARC | Creston | Dry land | X | X | | |
| SARC | Broadview | Dry land | X | X | | Hail damage |
| SARC | Huntley | Dry land | X | X | X | Hail damage |
| SARC | Huntley | Irrigated | X | X | X | Hail damage |
| WARC | Corvallis | Irrigated | X | X | X | |
| WTARC | Conrad | Dry land | X | X | X | |

[†]CARC = Central Agricultural Research Center, EARC = Eastern Agricultural Research Center, LRES = Land Resources and Environmental Sciences, NARC = Northern Agricultural Research Center, NWARC = Northwest Agricultural Research Center, SARC = Southern Agricultural Research Center, WARC = Western Agricultural Research Center, WTARC = Western Triangle Agricultural Research Center.

Precipitation

The total amount of precipitation received from April 1, 2016 to Aug 31, 2016 varied from site to site. The summary is shown in Table 3. Among the different sites, Corvallis received very low precipitation during this growing period but Sidney received the highest rainfall.

Table 3. Growing season and long term average precipitation and irrigation amount applied for each location

| | Bozeman (LRES) | Conrad (WTARC) | Corvallis (WARC) | Creston (NWARC) | Havre (NARC) | Huntley (SARC) | Moccasin (CARC) | Sidney (EARC) |
|---|-------------------|-------------------|---|--------------------|-----------------|--|--------------------|--|
| Seasonal precipitation (inch) (April – Aug, 2016) | 6.02 | 8.68 | 4.53 | 9.01 | 13.47 | 8.09 | 9.83 | 19.11 |
| Site Average (inch) | | 8.52 | 2.57 | 9.33 | 8.03 | 8.79 | 10.73 | 15.54 |
| Irrigation applied (inch) | | | 7" (0.6" every week after planting) | | | 2.5" total for pea one time; and for lentil and chickpea three times each time 1.5" with total of 4.5" | | 0.88, 1.5, 1.25, 0.75 and 1.45" in May 17, June 10, 11, 16 and 24, respectively |

Agronomic practices

The previous crops, seeding and harvesting dates, fertilization and weed management were different for the different testing sites. The summary of these practices and soil types by location are shown in Table 4.

Table 4. Major site information and agronomic management practices by location

| | Bozeman (LRES) | Conrad (WTARC) | Corvallis (WARC) Irri. | Creston (NWARC) | Sidney dry and Irri. (EARC) | Havre (NARC) | Huntley (SARC) | Moccasin (CARC) | Richland |
|-----------------------------------|---------------------|--------------------------------------|--|---|--|---|---|--|-----------------------------------|
| Tillage | | Chemical fallow | Culti-roller | Conventional | Conventional | No-till | No till | No till | No till |
| Soil Type | Amsterdam silt loam | | Burnt Fork Loam | Creston silt loam | Williams clay loam | Hilton Clay Loam | | Judith clay | |
| Elevation (ft) | 4800 | 3710 | 3600 | 2900 | 2200 | 2712 | 2725 | 4243 | 2950 |
| Pea Trials | | | | | | | | | |
| Dates: | | | | | | | | | |
| Seeding | | Apr. 22 | Apr. 26 | Apr. 22 | Apr. 8 dry and Apr. 21 irri. | Apr. 21 statewide and 22 western regional | April 4, 8 and 22 for B.view, dryland and irri., respectively. | April. 8 | May 3 |
| Harvest | July 26 | Aug. 30 and 31, | Sep. 26 | Aug. 22 | July 19 dry and July 29 irri. | July 26 | Jul 18, 19 and Aug. 8 for irri., dryland and B.view respectively. | Aug. 1 | Aug. 25 |
| Previous crop | | | Barley | Barley | Cereals for irri. and fallow for dryland | Spring wheat | Cereal for irri. and fallow for dryland | Winter wheat | Chemical fallow |
| Fertilizer | | | | | 44-0-0 | None | None | None | None |
| Herbicides and insecticide | | Prowl H ₂ O @3 pints/acre | Glyphosate at 1.7qt/ac and Prowl H ₂ O 1.7 qt/ac and Assure II at 10.5oz/ac Sevin 1.5 qrts/ac for pea weevils | May 18, 2016: Pursuit 2 oz/A + Basagran 16 oz/A + NIS 1qt/100 gal+2.5gal/100 gal 28%UAN June 3, 2016: Basagran 2 pt/A + Crop oil 1 pt/A + 4 pt/A 28%UAN June 23/2016: | Prowl H ₂ O at 3pt/ac and Assure II at 12 fl oz/ac. | Prowl H ₂ O; 2 pt/ac and Mustang Maxx, 4 oz/ac | RT3 24 oz/ac + 2pt Prow/ac | RT3 (18 fl oz/ac); Assure II (10 fl oz/ac); Prowl (32 fl oz/ac); RT3 (12 fl oz/ac); Warrior II (1.5 fl oz/ac); Assure II (12 fl oz/ac); Base Camp (10 fl oz/ac); Base Camp (16 fl oz/ac); RT3 (20 fl oz/ac | Roundup and ProwlH ₂ O |
| Lentil Trials | | | | | | | | | |
| Dates: | | | | | | | | | |
| Seeding | | Apr. 27 | Apr. 26 | Apr. 22 | Apr 11 dry and Apr 22 irri. | Apr. 22 statewide and May 3 western | April. 4-8 | Apr. 8 | May 4 |
| Harvest | | Sep. 10 | Sep. 26 | Aug. 29 | Aug. 8 dry and irri. | Aug. 4 | Aug. 8-16 | Aug. 1 | Oct. 14 |

| | | | | | | | | | |
|----------------------------|--|--------------------------------------|--|---|-------------------------------------|---|---|--|-----------------|
| Previous crop | | | Barley | Barley | Same as pea | Spring wheat | Barley | Winter wheat | Chemical fallow |
| Fertilizer | | | No | | 44-0-0 | None | | | |
| Herbicides and insecticide | | Prowl H ₂ O @3 pints/acre | Prowl H ₂ O; Assure II; Sevin XLR | Dimetric (metribuzin) 1/3 lb/A in June 27, 2016 | Same as pea | Prowl H ₂ O; 2 pt/ac and Mustang Maxx, 4 oz/ac | RT3 24 oz/ac + 2pt Prowl/ac | Same as pea | Same as pea |
| Chickpea Trials | | | | | | | | | |
| Dates: | | | | | | | | | |
| Seeding | | Apr. 26 | Info was not available for this report | Not Applicable | April 12 dryland and April 22 irri. | Not Applicable | Apr. 21 and 22 for irri. and dryland, respectively. | Apr. 11, | May 4 |
| Harvest | | Sep. 10 | | Not Applicable | Aug. 17 dryland and Sep. 19 irri. | Not Applicable | Aug. 23 and 24 for dryland and irri., respectively | 8/17/2016 (1 rep), 8/23/2016 (2 reps) | Oct. 15 |
| Previous | | | | Not Applicable | Same as pea | Not Applicable | Fallow for dryland and barely for irri. | Winter wheat | Fallow |
| Fertilizer | | | | Not Applicable | Same as pea | Not Applicable | | | |
| Herbicides and insecticide | | Prowl H ₂ O @3 pints/acre | | Not Applicable | Same as pea | Not Applicable | RT3 24 oz/ac + 2pt Prowl/ac | RT3 (18 fl oz/ac); Assure II (10 fl oz/ac); Prowl (32 fl oz/ac); RT3 (12 fl oz/ac); Base Camp (10 fl oz/ac); Base Camp (16 fl oz/ac); RT3 (20 fl oz/ac) | Same as pea |

RESULTS

The results presented in this report include from Statewide and Western Regional dry pea, lentil and chickpea variety evaluation trials. First, results from dry pea (yellow and green) are presented followed by lentil and chickpea. Unusual hail at Huntley resulted in serious damage to peas, lentils and chickpea variety trials particularly in dryland site. Therefore, there was no data for chickpea from the dryland site. At Corvallis site, data for chickpea were not ready for these report due to late harvest. At Richland site, there was severe disease and deer damage to lentil and chickpea variety trials. In some cases, some varieties yield almost nil for some plots due to sever disease pressure as result of late wet condition. In addition, the chickpea yield was very low at Richland site due to cold weather at the time of grain filling. At Conrad site, the trials were not randomized. We suggested to use randomization for the next season even if things looks homogenous from the soil point of view. With this brief introduction, the results are presented as follows.

Dry Pea

Statewide Dry Pea Variety Evaluation

A total of 53 dry pea varieties/entries (33 yellow and 20 green) (both commercial varieties and experimental lines) were evaluated in 2016 at 12 sites (Bozeman, Broadview, Conrad, Corvallis, Creston, Havre, Huntley dryland and Huntley irrigated, Moccasin, Richland and Sidney dryland and irrigated) across Montana State. Three of these sites (Huntley, Corvallis and Sidney) were irrigated. Some varieties submitted by private companies on a fee basis were tested at select locations only. Some entries from the pea line advancement trial were included in the statewide pea variety trial. The most common data collected and presented include grain yield, thousand kernel weight, test weight, plant height and number of days to flowering. However, only grain yield (bottom line) was consistently collected in the different testing sites. We suggest other researchers to strictly follow the research protocol to make it easier for comparison of entries across environments for the different parameters. The dry pea results are reported into two groups based on cotyledon color (yellow and green).

Yellow pea grain yield

Yellow pea grain yield varied greatly from site to site due to probably differences in environmental conditions and management practices. Mean grain yield for yellow pea for the different locations ranged from 659 lb/ac at Broadview to 5541 lb/ac at Richland (Table 6). The extremely low yields recorded at Broadview and Huntley Dryland were due to hail damage at flowering stage. Application of supplemental irrigation showed that the yield was increased by 966 lb/ac at Huntley irrigated compared with Huntley dryland. This may indicate the contribution of irrigation to recover from stress such as hail damage. Average yellow pea yields were 2320 lb/ac at Bozeman, 659 lb/ac at Broadview, 4039 lb/ac at Conrad, 2692 lb/ac with irrigation at Corvallis, 5414 lb/ac at Creston, 2438 lb/ac at Havre, 692 lb/ac Huntley (dryland), 1658 lb/ac Huntley irrigated, 1445 lb/ac at Moccasin, 5541 lb/ac at Richland, 3924 lb/ac Sidney dryland and 4158 lb/ac at Sidney irrigated (Table 6). The grain yields from irrigated sites (Huntley and Sidney) were substantially higher than yields from their respective dryland sites. This demonstrated the possibility to increase grain yield of pea with supplemental irrigation.

Yellow pea thousand kernel weight (TKW)

In 2016, only few testing sites recorded TKW and difficult to make conclusion. From the collected information, the highest was recorded from Moccasin site (249 g /1000 seeds) (Table 7).

Yellow pea test weight

Test weight data were recorded in most of the sites as shown in Table 8. The lowest mean test weight was recorded in Huntley (dryland) and the maximum was recorded at Broadview site (Table 8).

Yellow pea plant height

Mean plant height ranged from 18 cm to 100 cm. The lowest mean plant height was recorded from Corvallis site and the highest was recorded from Richland site (Table 9). Those entries that are tall and upright are important for harvesting. In addition, they produce more residue that will be left in the field after harvest. This will have substantial contribution to improve soil health.

Yellow pea days to flowering

Days to flowering data were recorded for most of the locations. From those locations, the mean number of days to flowering was longer at Moccasin (76 days) compared to other sites (Table 10). Moccasin also had longer time to flower in 2013, 2014 and 2015 compared with other sites.

Green pea grain yield

Some characteristics of the green pea entries are shown in Table 11. The mean grain yield for green pea ranged from 562 lb/ac to 5166 lb/ac. The average yields for green pea were 2162 lb/ac at Bozeman, 562 lb/ac at Broadview, 4003 lb/ac at Conrad, 2258 lb/ac at Corvallis with irrigation, 4717 lb/ac at Creston, 2265 lb/ac at Havre, 667 lb/ac at Huntley (dryland), 1579 lb/ac at Huntley (irrigated), 1303 lb/ac at Moccasin, 5166 lb/ac at Richland, 3571 lb/ac at Sidney dryland and 3917 at Sidney with irrigation (Table 12). The mean grain yield both for green and yellow pea was higher at Richland site than other locations.

Green pea thousand kernel weight (TKW)

TKW data for green pea was recorded only for few sites and ranged from 210 gm per 1000 seeds to 227 gm per 1000 seeds (Table 13).

Green pea test weight

The mean test weight for green pea ranged from 58.08 lb/bu to 66.24 lb/bu. The details are shown in Table 14.

Green pea plant height

Mean plant height ranged from 17 cm to 101 cm (Table 15). Similar to yellow pea, the mean green pea plant height was shorter at Corvallis.

Green pea days to flowering

The mean number of days to flower ranged from 56 days to 76 days at Moccasin (Table 16). Similarly, in 2014, the mean number of days to flowering was longer at Moccasin compared with other sites. The higher elevation in Moccasin have might resulted in lower temperature and slow growth thus taking more time to flower.

Summary

In 2016, the mean grain yield both for yellow and green pea was higher at Richland than other sites. Compared to all yellow pea varieties, the maximum mean grain yield (6845 lb/ac) was recorded from variety Nette 2010 at Creston. Similarly, the green color variety Viper resulted in maximum grain yield (6085 lb/ac) at Richland compared with other green color varieties. We found significant yield differences among varieties at several locations (Tables 6 and 12). On average, yellow pea varieties yielded 8% more grain yield than green pea. Several varieties have performed well in certain sites. However, none of the varieties consistently out yielded in all sites. In other words, the variety that resulted in maximum mean grain yield varied from location to location. This might suggest the importance of considering the release of site specific variety, due to the diverse ecologies of Montana, for better agronomic performances and economic returns.

Table 5. Yellow Dry Pea Variety Sources and Characteristics

| Variety* | Size | Maturity | Height | Breeding Program | Release Date |
|--------------|------|----------|--------|------------------|--------------|
| AC Agassiz | M | Late | Mod | AC | 2007 |
| Bridger | M | Mod | Mod | LL | 2011 |
| CDC Treasure | M | | Tall | CDC | 2009 |
| Delta | M | Mod | Short | | 1995 |
| DS Admiral | L | Mod | Tall | | 2000 |
| Gunner | | | | | |
| Jetset | L | Late | Mod | | |
| Korando | L | Late | Mod | | |
| Montech 4152 | ML | Mod | Tall | LIMG | 2009 |
| Montech 4193 | M | Mod | Mod | LIMG | |
| Mystique | L | Late | Mod | | |
| Navarro | VL | Early | Mod | | |
| Nette 2010 | | | | | |
| Pro 127-2 | M | Mod | Mod | PG | |
| Pro 793 | VL | Early | Short | PG | |
| Salamanca | | | | | |
| Spider | L | Mod | Tall | LL | 2008 |
| SW Midas | M | Mod | Mod | SW | 2004 |
| Torch | | | | | |
| Trapeze | VL | Late | Short | SW | 2010 |

CDC = Crop Development Centre, University of Saskatchewan; AC = Agriculture Canada; LL = Legume Logic; PG = ProGene Plant Research; LIMG = Limagrain, Nederland; SW = Svalöf-Weibull. *Because some of the breeding entries have not been registered and released as varieties and lack of information for other varieties, this table does not contain complete information for all entries tested.

Table 6. Montana Statewide Dry Yellow Pea Variety Evaluation – Grain Yield (lb/ac) in 2016.

| Yellow pea variety/line | Bozeman | Broadview | Conrad | Corvallis (Irri.) | Creston | Havre | Huntley* (Dry) | Huntley (Irri.) | Moccasin | Richland | Sidney (Dry) | Sidney (Irri.) |
|-------------------------|---------------|-------------------|---------------|-------------------|-------------------|-------------------|----------------|-------------------|-------------------|-------------------|---------------|-------------------|
| AAC Carver | | | 2985 | | | 2501 | | | 1468 | 5691 | 4101 | 5138 |
| AAC Lacombe | | | 2984 | | | 2575 | | | 1554 | | 4494 | 4729 |
| AC Earlystar | 2509 | 884 | 4852 | 3148 | 5297 | 2164 | 877 | 1704 | 1285 | 5228 | 3953 | 4883 |
| Abarth | 2601 | 915 | 3841 | | | 2924 | 423 | 1193 | 1335 | 5940 | 4156 | 4051 |
| Agassiz | 2385 | | 3863 | 3535 | 6274 | 2537 | | | 1545 | 5538 | 3915 | 5321 |
| Bridger | 2191 | 518 | 4223 | 2382 | 5201 | 2065 | 536 | 1296 | 1275 | 5791 | 3865 | 4474 |
| CDC Amarillo | | 446 | 3960 | 2920 | 5623 | 2372 | 887 | 2042 | 1713 | 5451 | 4006 | 5347 |
| CDC Saffron | 2297 | 850 | 4367 | 3245 | 5520 | 2979 | 847 | 1798 | 1569 | 6043 | 4172 | 4887 |
| CDC Treasure | 2100 | 303 | 3434 | 2466 | 5576 | 2132 | 878 | 1895 | 1293 | 5560 | 4006 | 4756 |
| DS Admiral | 2229 | 461 | 3239 | 3005 | 5699 | 2562 | 716 | 1911 | 1428 | 5166 | 3591 | 4643 |
| Delta | 2265 | 734 | 3933 | 2519 | 5143 | 2132 | 829 | 1535 | 1405 | 5459 | 3628 | 4352 |
| Durwood | 2369 | 740 | 3988 | | | 2616 | 717 | 2068 | 1817 | 5694 | 3986 | 4591 |
| Gunner | | | 4606 | | | 2455 | 894 | 1558 | 1514 | 5767 | | |
| Hyline | | 605 | 3929 | | | 2475 | 702 | 1860 | 1341 | 5397 | | |
| Jetset | 2560 | 471 | 3350 | 3066 | 5570 | 2636 | 851 | 1511 | 1422 | 6102 | 3812 | 4111 |
| Korando | | 823 | 4394 | | 5053 | 2462 | 521 | 1493 | 1303 | 5797 | 3851 | 4479 |
| MP 1907 | | | | | | | | | | | 4596 | 5681 |
| Majestic | | | | | | 2592 | | | 1595 | 6041 | | |
| Mystique | | | | | | | | | | 5704 | 3717 | 4036 |
| Navarro | 2167 | 788 | 4283 | 2555 | 4364 | 2305 | 467 | 1142 | 1279 | 5769 | 3765 | 3825 |
| Nette 2010 | 2398 | 798 | 5329 | 3240 | 6845 | 2508 | 594 | 1814 | 1469 | 6486 | 4038 | 4458 |
| PSO826MT460 | 2249 | 846 | 4286 | 1308 | 5286 | | 309 | 1784 | 1480 | 4724 | 3791 | 3955 |
| PSO826MT492 | 1937 | | | 1942 | 3488 | | 389 | 890 | 1241 | | 3993 | 5231 |
| PSO877MT632 | 2540 | 908 | 3330 | 1860 | 5709 | 2347 | 553 | 2040 | 1470 | 3625 | 2921 | 4105 |
| Pro 093-7410 | | | 4758 | 2583 | | 2444 | | | 1427 | 5656 | | |
| Pro 143-6220 | | | | | | 2018 | | | | 4860 | | |
| Pro 143-6236 | | | | | | 2317 | | | | 4853 | | |
| Pro 822 | | | | | | | 524 | 1432 | | | | |
| SW Marquee | | | | | | | | | | 5434 | | |
| SW Midas | | | | | | | | | | 5112 | 3715 | 4381 |
| Salamanca | | 589 | 4191 | | 5954 | 2566 | 930 | 1680 | 1476 | 6154 | | |
| Spider | | 401 | 4666 | | 5204 | 2259 | 874 | 2044 | 1392 | 5428 | | |
| Universal Yellow | | | | | 5214 | | | | | | | |
| <i>Mean</i> | <i>2320</i> | <i>659</i> | <i>4039</i> | <i>2692</i> | <i>5414</i> | <i>2438</i> | <i>692</i> | <i>1658</i> | <i>1445</i> | <i>5541</i> | <i>3924</i> | <i>4617</i> |
| <i>P-Value</i> | <i>0.0329</i> | <i><0.0001</i> | <i>0.0001</i> | <i>0.0001</i> | <i><0.0001</i> | <i><0.0001</i> | <i>0.0009</i> | <i><0.0001</i> | <i><0.0001</i> | <i><0.0001</i> | <i>0.0004</i> | <i><0.0001</i> |
| <i>LSD (0.05)</i> | <i>291</i> | <i>172</i> | <i>1072</i> | <i>745</i> | <i>816</i> | <i>286</i> | <i>262</i> | <i>282</i> | <i>225</i> | <i>800</i> | <i>536</i> | <i>663</i> |
| <i>CV (%)</i> | <i>8.64</i> | <i>18.46</i> | <i>18.78</i> | <i>19.59</i> | <i>10.66</i> | <i>8.31</i> | <i>26.83</i> | <i>12.04</i> | <i>11.03</i> | <i>10.27</i> | <i>9.67</i> | <i>10.15</i> |

Table 7. Montana Statewide Dry Yellow Pea Variety Evaluation –Thousand Kernel Weight (g) in 2016

| Yellow pea variety/line | Bozeman | Broadview | Conrad | Corvallis (Irri.) | Creston | Havre | Huntley (Dry) | Huntley (Irri.) | Moccasin | Richland | Sidney (Dry) | Sidney (Irri.) |
|-------------------------|---------|-----------|--------|-------------------|------------|------------|---------------|-----------------|------------|----------|--------------|----------------|
| AAC Carver | | | | | | 238 | | | 251 | | | |
| AAC Lacombe | | | | | | 267 | | | 281 | | | |
| AC Earlstar | | | | 233 | 216 | 211 | | | 235 | | | |
| Abarth | | | | | | 258 | | | 271 | | | |
| Agassiz | | | | 255 | 229 | 223 | | | 240 | | | |
| Bridger | | | | 238 | 222 | 218 | | | 233 | | | |
| CDC Amarillo | | | | 220 | 221 | 227 | | | 243 | | | |
| CDC Saffron | | | | 231 | 252 | 237 | | | 244 | | | |
| CDC Treasure | | | | 222 | 223 | 205 | | | 229 | | | |
| DS Admiral | | | | 234 | 241 | 234 | | | 244 | | | |
| Delta | | | | 215 | 250 | 227 | | | 229 | | | |
| Durwood | | | | | | 234 | | | 245 | | | |
| Gunner | | | | | | 234 | | | 252 | | | |
| Hyline | | | | | | 241 | | | 252 | | | |
| Jetset | | | | 252 | 247 | 239 | | | 236 | | | |
| Korando | | | | | 262 | 258 | | | 274 | | | |
| MP 1907 | | | | | | | | | | | | |
| Majestic | | | | | | 239 | | | 256 | | | |
| Mystique | | | | | | | | | | | | |
| Navarro | | | | 282 | 276 | 273 | | | 286 | | | |
| Nette 2010 | | | | 262 | 250 | 226 | | | 245 | | | |
| PSO826MT460 | | | | 260 | 250 | | | | 246 | | | |
| PSO877MT492 | | | | 234 | 229 | | | | 240 | | | |
| PSO877MT632 | | | | 226 | 234 | 224 | | | 241 | | | |
| Pro 093-7410 | | | | 211 | | 202 | | | 243 | | | |
| Pro 143-6220 | | | | | | 215 | | | | | | |
| Pro 143-6236 | | | | | | 205 | | | | | | |
| Pro 822 | | | | | | | | | | | | |
| SW Marquee | | | | | | | | | | | | |
| SW Midas | | | | | | | | | | | | |
| Salamanca | | | | | 254 | 249 | | | 258 | | | |
| Spider | | | | | 241 | 239 | | | 258 | | | |
| Universal Yellow | | | | | 242 | | | | | | | |
| Mean | | | | 238 | 241 | 232 | | | 249 | | | |
| P-Value | | | | <0.0001 | <0.0001 | <0.0001 | | | <0.0001 | | | |
| LSD (0.05) | | | | 20.6 | 10 | 7.2 | | | 11.4 | | | |
| CV (%) | | | | 6.11 | 2.94 | 2.17 | | | 3.22 | | | |

Table 8. Montana Statewide Dry Yellow Pea Variety Evaluation – Test Weight (lb/bu) in 2016

| Yellow pea variety/line | Bozeman | Broadview | Conrad | Corvallis (Irri.) | Creston | Havre | Huntley (Dry) | Huntley (Irri.) | Moccasin | Richland | Sidney (Dry) | Sidney (Irri.) |
|-------------------------|---------------|---------------|---------------|-------------------|-------------------|---------------|---------------|-----------------|---------------|-------------------|-------------------|-------------------|
| AAC Carver | | | 64.10 | | | 62.00 | | | 66.98 | 64.25 | 64.28 | 63.00 |
| AAC Lacombe | | | 62.78 | | | 60.98 | | | 65.58 | | 65.00 | 63.35 |
| AC Earlystar | 64.96 | 66.43 | 64.03 | 61.02 | 64.05 | 61.58 | 58.83 | 64.13 | 66.83 | 64.28 | 64.05 | 62.35 |
| Abarth | 65.26 | 65.23 | 62.95 | | | 61.38 | 59.70 | 63.20 | 66.23 | 63.65 | 64.28 | 62.30 |
| Agassiz | 64.53 | | 60.33 | 60.95 | 62.70 | 61.30 | | | 66.10 | 63.03 | 64.13 | 62.42 |
| Bridger | 65.67 | 66.73 | 61.35 | 61.72 | 64.70 | 62.18 | 61.70 | 63.70 | 67.40 | 64.70 | 64.55 | 62.98 |
| CDC Amarillo | | 66.08 | 64.00 | 61.88 | 64.63 | 61.43 | 61.00 | 63.30 | 66.25 | 64.55 | 64.48 | 63.20 |
| CDC Saffron | 65.27 | 66.33 | 61.05 | 61.83 | 65.08 | 61.90 | 58.00 | 61.60 | 66.40 | 64.20 | 64.78 | 63.30 |
| CDC Treasure | 65.97 | 64.78 | 63.55 | 62.10 | 64.75 | 62.18 | 57.07 | 63.55 | 67.25 | 65.45 | 64.78 | 63.85 |
| DS Admiral | 64.33 | 66.58 | 61.90 | 61.85 | 63.98 | 61.53 | 58.20 | 63.70 | 66.45 | 64.35 | 63.50 | 62.60 |
| Delta | 65.57 | 66.33 | 62.18 | 61.92 | 63.85 | 61.93 | 56.43 | 62.30 | 67.10 | 63.63 | 64.20 | 62.05 |
| Durwood | 65.40 | 66.38 | 63.08 | | | 61.70 | 58.70 | 64.45 | 67.23 | 63.98 | 64.05 | 62.50 |
| Gunner | | | 65.20 | | | 61.43 | 62.67 | 63.63 | 66.60 | 64.15 | | |
| Hyline | | 66.63 | 65.35 | | | 61.80 | 61.03 | 62.43 | 66.33 | 64.35 | | |
| Jetset | 65.70 | 67.18 | 60.53 | 61.60 | 64.70 | 61.18 | 61.00 | 62.35 | 66.75 | 64.55 | 64.13 | 62.45 |
| Korando | | 65.70 | 60.63 | | 64.13 | 61.18 | 57.93 | 62.68 | 66.28 | 63.75 | 62.75 | 61.65 |
| MP 1907 | | | | | | | | | | | 64.53 | 63.85 |
| Majestic | | | | | | 61.60 | | | 66.38 | 64.55 | | |
| Mystique | | | | | | | | | | 63.18 | 63.70 | 62.66 |
| Navarro | 65.46 | 65.83 | 62.88 | 60.25 | 64.48 | 61.15 | 57.20 | 62.45 | 66.10 | 64.20 | 63.78 | 62.38 |
| Nette 2010 | 66.13 | 67.13 | 64.93 | 62.67 | 65.80 | 61.70 | 58.63 | 63.00 | 67.63 | 65.23 | 64.75 | 63.42 |
| PSO826MT460 | 64.33 | 65.73 | | 60.43 | 63.13 | | 61.50 | 63.80 | 65.73 | 62.00 | 63.20 | 62.07 |
| PSO826MT492 | 64.93 | | 61.33 | 61.47 | 63.43 | | 60.30 | 62.30 | 66.80 | | 64.27 | |
| PSO877MT632 | 65.67 | 66.27 | 63.60 | 61.07 | 63.63 | 61.97 | 58.70 | 64.27 | 66.60 | 64.17 | 63.67 | 61.90 |
| Pro 093-7410 | | | 64.05 | 62.02 | | 61.50 | | | 66.85 | 64.58 | | |
| Pro 143-6220 | | | | | | 61.43 | | | | 64.50 | | |
| Pro 143-6236 | | | | | | 61.68 | | | | 64.05 | | |
| Pro 822 | | | | | | | 58.37 | 65.13 | | | | |
| SW Marquee | | | | | | | | | | 64.48 | | |
| SW Midas | | | | | | | | | | 64.18 | 64.42 | 63.15 |
| Salamanca | | 65.30 | 64.27 | | 64.05 | 61.45 | 60.47 | 57.08 | 67.10 | 64.05 | | |
| Spider | | 66.18 | 62.83 | | 63.73 | 61.58 | 62.23 | 64.50 | 66.00 | 63.80 | | |
| Universal Yellow | | | | | 63.48 | | | | | | | |
| Mean | 65.27 | 66.16 | 62.84 | 61.52 | 64.16 | 61.58 | 59.42 | 62.97 | 66.60 | 64.15 | 64.16 | 62.76 |
| P-Value | 0.0004 | 0.6595 | 0.2640 | 0.0035 | <0.0001 | 0.0586 | 0.6776 | 0.3465 | 0.0004 | <0.0001 | <0.0001 | <0.0001 |
| LSD (0.05) | 0.78 | Ns | Ns | 1.14 | 0.89 | Ns | Ns | Ns | 0.86 | 0.82 | 0.82 | 0.72 |
| CV (%) | 0.71 | 2.02 | 4.05 | 1.32 | 0.98 | 0.80 | 5.50 | 4.79 | 0.92 | 0.90 | 0.90 | 0.81 |

Table 9. Montana Statewide Dry Yellow Pea Evaluation – Plant Height (cm) in 2016

| Yellow pea variety/line | Bozeman | Broadview | Conrad | Corvallis (Irri.) | Creston | Havre | Huntley (Dry) | Huntley (Irri.) | Moccasin | Richland | Sidney (Dry) | Sidney (Irri.) |
|-------------------------|-------------------|-----------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------|---------------|-------------------|
| AAC Carver | | | 58 | | | 60 | | | 52 | 103 | 69 | 60 |
| AAC Lacombe | | | 52 | | | 62 | | | 48 | | 70 | 71 |
| AC Earlystar | 63 | | 57 | 20 | 109 | 54 | 41 | 70 | 46 | 114 | 63 | 64 |
| Abarth | 55 | | 58 | | | 61 | 38 | 73 | 42 | 96 | 64 | 61 |
| Agassiz | 54 | | 50 | 19 | 114 | 56 | | | 41 | 95 | 59 | 53 |
| Bridger | 52 | | 47 | 18 | 88 | 50 | 41 | 58 | 39 | 102 | 58 | 61 |
| CDC Amarillo | | | 56 | 25 | 93 | 57 | 47 | 76 | 49 | 107 | 69 | 72 |
| CDC Saffron | 48 | | 57 | 16 | 89 | 54 | 36 | 63 | 43 | 98 | 66 | 60 |
| CDC Treasure | 60 | | 74 | 19 | 105 | 56 | 47 | 72 | 47 | 100 | 62 | 59 |
| DS Admiral | 59 | | 59 | 18 | 102 | 57 | 47 | 76 | 46 | 103 | 59 | 57 |
| Delta | 45 | | 58 | 13 | 87 | 46 | 35 | 62 | 35 | 94 | 61 | 47 |
| Durwood | 64 | | 70 | | | 58 | 40 | 87 | 54 | 108 | 72 | 65 |
| Gunner | | | 55 | | | 61 | 41 | 73 | 49 | 104 | | |
| Hyline | | | 56 | | | 57 | 36 | 71 | 47 | 103 | | |
| Jetset | 57 | | 59 | 17 | 98 | 59 | 43 | 72 | 48 | 99 | 62 | 66 |
| Korando | | | 58 | | 100 | 52 | 46 | 70 | 41 | 102 | 61 | 57 |
| MP 1907 | | | | | | | | | | | 60 | 69 |
| Majestic | | | | | | 58 | | | 46 | 109 | | |
| Mystique | | | | | | | | | | 110 | 64 | 72 |
| Navarro | 55 | | 58 | 17 | 88 | 50 | 40 | 70 | 42 | 103 | 60 | 54 |
| Nette 2010 | 53 | | 63 | 18 | 96 | 54 | 39 | 67 | 41 | 94 | 63 | 62 |
| PSO826MT460 | 41 | | | 14 | 88 | | 26 | 62 | 40 | 94 | 62 | 43 |
| PSO826MT492 | 51 | | 56 | 17 | 91 | | 33 | 52 | 42 | | 52 | 60 |
| PSO877MT632 | 52 | | 50 | 14 | 100 | 54 | 36 | 60 | 44 | 97 | 65 | 27 |
| Pro 093-7410 | | | 54 | 17 | | 47 | | | 43 | 95 | | |
| Pro 143-6220 | | | | | | 56 | | | | 100 | | |
| Pro 143-6236 | | | | | | 48 | | | | 86 | | |
| Pro 822 | | | | | | | 37 | 71 | | | | |
| SW Marquee | | | | | | | | | | 99 | | |
| SW Midas | | | | | | | | | | 90 | 59 | 58 |
| Salamanca | | | 47 | | 106 | 62 | 45 | 74 | 47 | 100 | | |
| Spider | | | 57 | | 112 | | 47 | 76 | 45 | 102 | | |
| Universal Yellow | | | | | 89 | | | | | | | |
| Mean | 54 | | 57 | 18 | 98 | 56 | 40 | 69 | 45 | 100 | 63 | 59 |
| P-Value | <0.0001 | | <0.0001 | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.2567 | 0.0695 | <0.0001 |
| LSD (0.05) | 3.6 | | 5.1 | 3.6 | 14.8 | 7.1 | 5.7 | 8.6 | 5 | <i>Ns</i> | <i>Ns</i> | 9.9 |
| CV (%) | 4.05 | | 6.31 | 14.43 | 10.71 | 8.98 | 10.11 | 8.75 | 9.49 | 12.32 | 10.99 | 11.84 |

Table 10. Montana Statewide Dry Yellow Pea Variety Evaluation – Number of Days to Flowering in 2016

| Yellow pea variety/line | Bozeman | Broadview | Conrad* | Corvallis (Irri.) | Creston | Havre | Huntley (Dry) | Huntley (Irri.) | Moccasin | Richland | Sidney (Dry) | Sidney (Irri.) |
|-------------------------|---------|-----------|-------------------|-------------------|-------------------|-------------------|---------------|-----------------|-------------------|----------|-------------------|-------------------|
| AAC Carver | | | 67 | | | 60 | | | 77 | | 70 | 58 |
| AAC Lacombe | | | 68 | | | 62 | | | 79 | | 71 | 57 |
| AC Earlystar | | | 65 | 63 | 62 | 58 | | | 76 | | 68 | 55 |
| Abarth | | | 64 | | | 59 | | | 75 | | 68 | 56 |
| Agassiz | | | 65 | 61 | 65 | 60 | | | 76 | | 70 | 58 |
| Bridger | | | 64 | 59 | 63 | 58 | | | 75 | | 67 | 55 |
| CDC Amarillo | | | 65 | 63 | 66 | 61 | | | 78 | | 70 | 58 |
| CDC Saffron | | | 66 | 65 | 65 | 61 | | | 78 | | 70 | 57 |
| CDC Treasure | | | 64 | 63 | 62 | 58 | | | 75 | | 69 | 55 |
| DS Admiral | | | 65 | 63 | 63 | 60 | | | 76 | | 68 | 56 |
| Delta | | | 62 | 63 | 60 | 57 | | | 75 | | 67 | 57 |
| Durwood | | | 64 | | | 58 | | | 76 | | 70 | 57 |
| Gunner | | | 66 | | | 59 | | | 76 | | | |
| Hyline | | | 65 | | | 60 | | | 76 | | | |
| Jetset | | | | 63 | 64 | 60 | | | 75 | | 70 | 55 |
| Korando | | | 58 | | 63 | 55 | | | 73 | | 66 | 57 |
| MP 1907 | | | | | | | | | | | 70 | 58 |
| Majestic | | | | | | 59 | | | 78 | | | |
| Mystique | | | | | | | | | | | 70 | 58 |
| Navarro | | | 58 | 55 | 61 | 55 | | | 74 | | 65 | 56 |
| Nette 2010 | | | 60 | 55 | 59 | 57 | | | 75 | | 66 | 57 |
| PSO826MT460 | | | 64 | 58 | 59 | | | | 74 | | 68 | 58 |
| PSO826MT492 | | | | 55 | 59 | | | | 74 | | 68 | 56 |
| PSO877MT632 | | | 65 | 58 | 61 | 57 | | | 75 | | 67 | 58 |
| Pro 093-7410 | | | 61 | 57 | | 58 | | | 75 | | | |
| Pro 143-6220 | | | | | | 61 | | | | | | |
| Pro 143-6236 | | | | | | 58 | | | | | | |
| Pro 822 | | | | | | | | | | | | |
| SW Marquee | | | | | | | | | | | | |
| SW Midas | | | | | | | | | | | 70 | 57 |
| Salamanca | | | 64 | | 65 | 59 | | | 76 | | | |
| Spider | | | 66 | | 66 | 60 | | | 77 | | | |
| Universal Yellow | | | | | 59 | | | | | | | |
| Mean | | | 64 | 60 | 62 | 59 | | | 76 | | 68 | 57 |
| P-Value | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | | | <0.0001 | | <0.0001 | <0.0001 |
| LSD (0.05) | | | | 3.7 | 1.7 | 0.9 | | | 1.63 | | 2.3 | 1.5 |
| CV (%) | | | | 4.37 | 1.88 | 1.10 | | | 1.52 | | 2.42 | 1.88 |

*There was no flowering date difference for a variety between reps. That means, a variety flower the same date in the different replications.

Table 11. Green Pea Variety Sources and Characteristics

| Variety* | Size | Maturity | Height | Breeding | Release |
|-------------|------|----------|--------|----------|---------|
| Aragorn | M | Mod | Mod | PG | 2006 |
| Arcadia | M | Mod | Short | | 2009 |
| Banner | M | Early | Tall | PG | 2007 |
| Bluemoon | VL | Late | Short | | |
| CDC Striker | L | Mod | Mod | CDC | 2002 |
| Cruiser | S | Mod | Tall | PG | 2002 |
| Daytona | VL | Late | Short | | |
| Greenwood | | | | | |
| K2 | M | Mod | Mod | LL | 2005 |
| Majoret | M | Mod | Short | SW | 1994 |
| PS07ND0190 | M | Late | Tall | NDSU | |
| Shamrock | | | | | |
| Viper | L | Late | Mod | | |

PG = ProGene Plant Research; CDC = Crop Development Centre, University of Saskatchewan; LL = Legume Logic; NDSU = North Dakota State University; LIMG = LImagrain, Netherlands; SW = Svalöf-Weibull.

*Because some of the breeding entries have not been registered and released as varieties and lack of information for other varieties, this table does not contain complete information for all entries tested and no inclusive.

Table 12. Montana Statewide Dry Green Pea Variety Evaluation – Grain Yield (lb/ac) in 2016.

| Green pea variety/line | Bozeman | Broadview | Conrad | Corvallis (Irri.) | Creston | Havre | Huntley (Dry) | Huntley (Irri.) | Moccasin | Richland | Sidney (Dry) | Sidney (Irri.) |
|------------------------|---------------|---------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|
| Aragon | 1948 | | 4939 | 1911 | 4404 | 1720 | | | 1204 | 5036 | 2966 | 3507 |
| Arcadia | 2029 | 604 | 4838 | | | 2479 | 541 | 1691 | 1186 | 5865 | 3783 | 5277 |
| Banner | | | 3706 | | | 2224 | | | 1308 | | | |
| CDC Patrick | | | 2944 | | | 2303 | | | 1393 | 4703 | 3733 | 4737 |
| CDC Raezer | | | 2764 | | | 2135 | | | 1335 | 4778 | 3707 | 3825 |
| Cruiser | 2001 | | 2923 | 2632 | 4737 | 2008 | | | 1155 | 5291 | 3294 | 4218 |
| Ginny | | 512 | 3696 | | | 2402 | 739 | 1484 | 1294 | 5697 | | |
| Greenwood | 1957 | | 3863 | 2639 | 5128 | 2121 | | | 1361 | 5406 | 3795 | 4440 |
| Hampton | 2407 | 669 | 3923 | 2269 | 5083 | 2797 | 773 | 1884 | 1444 | 4023 | 3630 | 4103 |
| K2 | | | | | | | | | | | 3468 | 4161 |
| LN 1123 | 2189 | 750 | 4089 | | | 2695 | 751 | 1638 | 1372 | 5846 | 3656 | 2068 |
| Majoret | 2067 | 282 | 2367 | 1710 | 5024 | 2459 | 693 | 1300 | 1265 | 4897 | 3819 | 4406 |
| PSO877MT457 | 2325 | 536 | | | 4952 | | 747 | 1395 | 1416 | 5330 | 3275 | 4470 |
| PSO826MT190 | 2171 | 586 | 4386 | 2919 | 4764 | 2125 | 869 | 1691 | 1174 | 5100 | 3579 | 3484 |
| PSO877MT076 | 2350 | 884 | 4231 | 2337 | 4540 | 2356 | 412 | 2421 | 1426 | 3797 | 3701 | 3110 |
| PSO877MT499 | 2067 | 422 | 4670 | 2041 | 3557 | 2016 | 523 | 1317 | 1239 | 5456 | 3681 | 2440 |
| Pro 131-6221 | | | 5106 | | | | | | | | | |
| Pro 131-7123 | | | 4730 | | | 2455 | 720 | | | | | |
| Pro 131-7125 | | | 4643 | | | 2221 | | | | | | |
| Viper | 2439 | 447 | 3636 | | | 1976 | 532 | 1105 | 1294 | 6085 | 3477 | 3963 |
| Mean | 2162 | 562 | 4003 | 2258 | 4717 | 2265 | 667 | 1579 | 1303 | 5166 | 3571 | 3917 |
| P-value | 0.0211 | 0.0007 | 0.0004 | 0.0404 | 0.0621 | <0.0001 | 0.0454 | <0.0001 | 0.0008 | <0.0001 | 0.4467 | <0.0001 |
| LSD (0.05) | 275 | 167 | 1173 | 720 | <i>Ns</i> | 286 | 217 | 234 | 184 | 603 | <i>Ns</i> | 562 |
| CV (%) | 9.02 | 21.11 | 20.71 | 22.56 | 13.21 | 8.94 | 23.02 | 10.49 | 10.01 | 8.14 | 12.22 | 10.13 |

Table 13. Montana Statewide Dry Green Pea Variety Evaluation – Thousand Kernel Weight (TKW in g) in 2016

| Green pea variety/line | Bozeman | Broadview | Conrad | Corvallis (Irri.) | Creston | Havre | Huntley (Dry) | Huntley (Irri.) | Moccasin | Richland | Sidney (Dry) | Sidney (Irri.) |
|------------------------|---------|-----------|--------|-------------------|-------------------|-------------------|---------------|-----------------|-------------------|----------|--------------|----------------|
| Aragon | | | | 226 | 224 | 204 | | | 222 | | | |
| Arcadia | | | | | | 206 | | | 216 | | | |
| Banner | | | | | | 199 | | | 223 | | | |
| CDC Patrick | | | | | | 184 | | | 201 | | | |
| CDC Raezer | | | | | | 219 | | | 236 | | | |
| Cruiser | | | | 223 | 221 | 203 | | | 208 | | | |
| Ginny | | | | | | 211 | | | 218 | | | |
| Greenwood | | | | 207 | 215 | 199 | | | 215 | | | |
| Hampton | | | | 241 | 226 | 223 | | | 241 | | | |
| K2 | | | | | | | | | | | | |
| LN 1123 | | | | | | 229 | | | 236 | | | |
| Majoret | | | | 219 | 235 | 232 | | | 239 | | | |
| PS0877MT457 | | | | | 235 | | | | 244 | | | |
| PSO826MT190 | | | | 221 | 219 | 208 | | | 231 | | | |
| PSO877MT076 | | | | 210 | 201 | 209 | | | 225 | | | |
| PSO877MT499 | | | | 250 | 230 | 222 | | | 227 | | | |
| Pro 131-6221 | | | | | | | | | | | | |
| Pro 131-7123 | | | | | | | | | | | | |
| Pro 131-7125 | | | | | | | | | | | | |
| Viper | | | | | | 189 | | | 253 | | | |
| Mean | | | | 225 | 223 | 210 | | | 227 | | | |
| P-value | | | | 0.1070 | <0.0001 | <0.0001 | | | <0.0001 | | | |
| LSD (0.05) | | | | Ns | 8.6 | 5.6 | | | 11.9 | | | |
| CV (%) | | | | 7.04 | 2.73 | 1.89 | | | 3.73 | | | |

Table 14. Montana Statewide Dry Green Pea Variety Evaluation – Test Weight (lb/bu) in 2016

| Green pea variety/line | Bozeman | Broadview | Conrad | Corvallis (Irri.) | Creston | Havre | Huntley (Dry) | Huntley (Irri.) | Moccasin | Richland | Sidney (Dry) | Sidney (Irri.) |
|------------------------|-------------------|---------------|---------------|-------------------|---------------|-------------------|---------------|-----------------|-------------------|-------------------|---------------|----------------|
| Aragon | 63.60 | | 64.20 | 61.05 | 63.25 | 61.48 | | | 65.08 | 64.25 | 63.35 | 62.10 |
| Arcadia | 64.27 | 65.95 | 64.35 | | | 61.78 | 61.80 | 66.18 | 66.88 | 64.15 | 61.18 | 62.50 |
| Banner | | | 62.63 | | | 61.85 | | | 66.65 | | | |
| CDC Patrick | | | 64.77 | | | 61.43 | | | 66.55 | 64.20 | 63.88 | 62.13 |
| CDC Raezer | | | 64.55 | | | 61.10 | | | 66.10 | 64.33 | 63.48 | 62.82 |
| Cruiser | 63.40 | | 63.25 | 61.60 | 63.35 | 61.00 | | | 65.23 | 64.08 | 64.35 | 62.33 |
| Ginny | | 66.20 | 64.73 | | | 61.30 | 55.10 | 65.45 | 66.73 | 64.30 | | |
| Greenwood | 65.00 | | 64.35 | 63.07 | 64.53 | 62.18 | | | 66.45 | 64.83 | 64.70 | 63.37 |
| Hampton | 63.87 | 64.83 | 63.88 | 60.00 | 62.65 | 60.88 | 57.87 | 60.88 | 65.53 | 63.20 | 63.83 | 61.38 |
| K2 | | | | | | | | | | | 63.70 | 62.60 |
| LN 1123 | 66.13 | 67.18 | 61.73 | | | 61.75 | 58.03 | 65.65 | 67.18 | 64.00 | 64.20 | 62.60 |
| Majoret | 64.70 | 62.93 | 62.20 | 62.20 | 64.03 | 61.43 | 59.37 | 63.58 | 66.83 | 65.08 | 64.50 | 62.63 |
| PS0877MT457 | 63.87 | 65.40 | | | 62.57 | | 59.43 | 62.83 | 65.57 | 63.37 | 62.67 | 62.33 |
| PSO826MT190 | 64.60 | 65.43 | 61.00 | 62.75 | 63.87 | 61.17 | 60.00 | 63.43 | 65.60 | 63.47 | 63.47 | 61.77 |
| PSO877MT076 | 63.90 | 65.15 | 62.17 | 61.80 | 62.60 | 60.80 | 55.50 | 61.43 | 66.17 | 63.53 | 63.43 | 61.90 |
| PSO877MT499 | 65.03 | 64.40 | 62.80 | 60.27 | 63.73 | 62.23 | 58.33 | 62.60 | 66.50 | 64.17 | 63.70 | 61.50 |
| Pro 131-6221 | | | 63.43 | | | | | | | | | |
| Pro 131-7123 | | | 62.95 | | | | 57.53 | | | | | |
| Pro 131-7125 | | | 63.45 | | | | | | | | | |
| Viper | 65.17 | 65.65 | 62.90 | | | 60.63 | 56.27 | 62.58 | 66.60 | 64.33 | 63.75 | 62.15 |
| Mean | 64.46 | 65.31 | 63.38 | 61.49 | 63.42 | 61.40 | 58.08 | 63.56 | 66.24 | 64.10 | 63.84 | 62.28 |
| P-value | <0.0001 | 0.1413 | 0.1608 | 0.0403 | 0.0010 | <0.0001 | 0.5899 | 0.2464 | <0.0001 | <0.0001 | 0.0127 | 0.3568 |
| LSD (0.05) | 0.79 | Ns | Ns | 1.47 | 0.74 | 0.52 | Ns | Ns | 0.31 | 0.55 | 0.88 | Ns |
| CV (%) | 0.73 | 2.41 | 2.52 | 1.69 | 0.82 | 0.60 | 6.47 | 4.63 | 0.67 | 0.59 | 0.98 | 1.44 |

Table 15. Montana Statewide Dry Green Pea Variety Evaluation – Plant Height (cm) in 2016

| Green pea variety/line | Bozeman | Broadview | Conrad | Corvallis (Irri.) | Creston | Havre | Huntley (Dry) | Huntley (Irri.) | Moccasin | Richland | Sidney (Dry) | Sidney (Irri.) |
|------------------------|-------------------|-----------|-------------------|-------------------|---------------|---------------|---------------|-----------------|-------------------|---------------|---------------|----------------|
| Aragon | 48 | | 48 | 16 | 87 | 57 | | | 43 | 108 | 57 | 44 |
| Arcadia | 42 | | 41 | | | 47 | 31 | 57 | 36 | 97 | 58 | 47 |
| Banner | | | 51 | | | 51 | | | 42 | | | |
| CDC Patrick | | | 54 | | | 58 | | | 46 | 94 | 59 | 59 |
| CDC Raezer | | | 68 | | | 55 | | | 49 | 100 | 69 | 58 |
| Cruiser | 52 | | 61 | 18 | 89 | 52 | | | 41 | 103 | 54 | 51 |
| Ginny | | | 53 | | | 50 | 36 | 66 | 39 | 107 | | |
| Greenwood | 47 | | 53 | 18 | 85 | 52 | | | 39 | 84 | 60 | 47 |
| Hampton | 47 | | 54 | 14 | 85 | 53 | 37 | 66 | 35 | 93 | 57 | 31 |
| K2 | | | | | | | | | | | 59 | 54 |
| LN 1123 | 51 | | 54 | | | 57 | 44 | 72 | 42 | 99 | 64 | 66 |
| Majoret | 53 | | 54 | 18 | 92 | 54 | 46 | 67 | 43 | 89 | 58 | 50 |
| PS0877MT457 | 57 | | | | 111 | | 41 | 76 | 44 | 107 | 58 | 49 |
| PSO826MT190 | 52 | | 54 | 18 | 109 | 60 | 46 | 71 | 49 | 114 | 60 | 69 |
| PSO877MT076 | 55 | | 52 | 19 | 108 | 60 | 28 | 67 | 39 | 107 | 55 | 52 |
| PSO877MT499 | 55 | | 51 | 18 | 82 | 51 | 43 | 66 | 40 | 114 | 62 | 42 |
| Pro 131-6221 | | | 50 | | | | | | | | | |
| Pro 131-7123 | | | 52 | | | | 35 | | | | | |
| Pro 131-7125 | | | 50 | | | | | | | | | |
| Viper | 59 | | 53 | | | 52 | 40 | 66 | 46 | 105 | 65 | 51 |
| Mean | 52 | | 53 | 17 | 93 | 53 | 39 | 67 | 42 | 101 | 60 | 51 |
| P-value | <0.0001 | | <0.0001 | 0.5487 | 0.0124 | 0.0006 | 0.0100 | 0.0009 | <0.0001 | 0.2576 | 0.2683 | 0.0013 |
| LSD (0.05) | 5.4 | | 3.6 | Ns | 16.8 | 6.3 | 7.5 | 6.9 | 5.42 | Ns | Ns | 13.8 |
| CV (%) | 6.26 | | 4.78 | 16.13 | 12.79 | 8.39 | 13.69 | 7.23 | 9.16 | 12.75 | 11.51 | 19.11 |

Table 16. Montana Statewide Dry Green Pea Variety Evaluation – Number of Days to Flowering in 2016

| Green pea variety/line | Bozeman | Broadview | Conrad* | Corvallis (Irri.) | Creston | Havre | Huntley (Dry) | Huntley (Irri.) | Moccasin | Richland | Sidney (Dry) | Sidney (Irri.) |
|------------------------|---------|-----------|-------------------|-------------------|-------------------|-------------------|---------------|-----------------|-------------------|----------|---------------|----------------|
| Aragon | | | 64 | 55 | 60 | 58 | | | 75 | | 67 | 54 |
| Arcadia | | | | | | 59 | | | 77 | | 69 | 55 |
| Banner | | | 64 | | | 56 | | | 71 | | | |
| CDC Patrick | | | | | | 61 | | | 77 | | 70 | 58 |
| CDC Raezer | | | 64 | | | 59 | | | 77 | | 70 | 57 |
| Cruiser | | | 64 | 55 | 61 | 59 | | | 76 | | 69 | 55 |
| Ginny | | | 65 | | | 58 | | | 75 | | | |
| Greenwood | | | 66 | 61 | 60 | 58 | | | 75 | | 70 | 56 |
| Hampton | | | | 63 | 66 | 61 | | | 77 | | 71 | 57 |
| K2 | | | | | | | | | | | 66 | 57 |
| LN 1123 | | | | | | 61 | | | 79 | | 69 | 57 |
| Majoret | | | | 63 | 65 | 61 | | | 78 | | 69 | 55 |
| PS0877MT457 | | | | | 59 | | | | 74 | | 65 | 55 |
| PSO826MT190 | | | 64 | 63 | 63 | 59 | | | 77 | | 69 | 57 |
| PSO877MT076 | | | 64 | 63 | 64 | 59 | | | 77 | | 67 | 58 |
| PSO877MT499 | | | 66 | 55 | 59 | 56 | | | 73 | | 65 | 56 |
| Pro 131-6221 | | | 65 | | | | | | | | | |
| Pro131-7123 | | | 65 | | | | | | | | | |
| Pro131-7125 | | | 66 | | | | | | | | | |
| Viper | | | 66 | | | 61 | | | 75 | | 67 | 55 |
| Mean | | | 65 | 60 | 62 | 59 | | | 76 | | 68 | 56 |
| P-value | | | <0.0001 | 0.0034 | <0.0001 | <0.0001 | | | <0.0001 | | 0.0008 | 0.0047 |
| LSD (0.05) | | | | 4.0 | 1.6 | 0.8 | | | 1.4 | | 2.7 | 1.62 |
| CV (%) | | | | 5.14 | 1.78 | 0.99 | | | 1.29 | | 2.79 | 2.03 |

*There was no flowering date difference for a variety between reps. That means, a variety flower the same date in the different replications.

Multi-Year and Multi-Location Statewide Dry Pea Variety Evaluation Summary

Multi-year (2009-2016) Summary:

The multi-year grain yield data for different varieties and locations are shown in Table 17. One of the problem with this multi-year data is that every year variety changed and make it difficult for comparison purpose to calculate the mean for a variety across years. This is because the interest of seed companies to test their varieties change every year in terms of submitting type of varieties and selecting testing sites. However, this table may provide some information for those interested in the magnitude of yield change across years for only those few varieties submitted every year.

Table 17. Montana Statewide Dry Pea Variety Evaluation – 2009-2016 Multi-Year Grain Yield Summary (lb/ac)

| Varieties | Bozeman | | | | | | | | Conrad | | | | | | | |
|-------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------|-------------|
| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Yellow Pea | | | | | | | | | | | | | | | | |
| AC Agassiz | | | | 905 | 1857 | 2492 | 1384 | 2385 | | | 2867 | 2746 | 1519 | 2876 | | 3863 |
| Bridger | | | 2476 | 1085 | 1763 | 2464 | | 2191 | | | 3259 | 2793 | 1741 | 2212 | | 4223 |
| Delta | 2158 | 3118 | 2105 | 1011 | 1779 | | 1564 | 2265 | 3996 | 869 | 2832 | 2526 | 1641 | | | 3933 |
| DS Admiral | 2486 | 3439 | 2206 | 910 | 1910 | 2665 | 1569 | 2229 | 3607 | 1212 | 3070 | 2204 | 1638 | 2795 | | 3239 |
| Montech 4152 | | | 2378 | 1074 | 2019 | 2444 | | | | | 3066 | 3116 | 1862 | 3456 | | |
| Spider | | | 2188 | 1037 | 1971 | | | | | 1100 | 2664 | 2426 | 1748 | 3492 | | 4666 |
| SW Midas | 2018 | 3436 | 2382 | 1048 | 1780 | 2396 | | | 3620 | 1212 | 2774 | 2674 | 1846 | 3216 | | |
| Yellow Ave* | 2193 | 3277 | 2246 | 1008 | 1883 | 2452 | 1577 | 2320 | 3789 | 1181 | 2853 | 2745 | 1741 | 2723 | | 4039 |
| Green Pea | | | | | | | | | | | | | | | | |
| Arcadia | | | 2378 | 966 | 1978 | 2349 | 1101 | 2029 | | | 3178 | 2281 | 1718 | 3346 | | 4838 |
| CDC Striker | 2343 | 2585 | 2081 | 918 | 1502 | 2283 | 1385 | | 3189 | 1147 | 2632 | 2254 | 1812 | 2017 | | |
| Cruiser | 2247 | 3041 | 2152 | 872 | 1731 | 2101 | | 2001 | 3154 | 965 | 2746 | 2002 | 1488 | 2995 | | 2923 |
| K2 | | | 2018 | 962 | 1500 | | | | | 1304 | 2622 | 2246 | 1713 | 2619 | | |
| Majoret | 2218 | 3008 | 2039 | 961 | 1705 | 2255 | 1110 | 2067 | 3345 | 1623 | 2382 | 2407 | 1607 | 2469 | | 2367 |
| Stirling | 2031 | 3288 | 2184 | 1088 | | | | | 3932 | 926 | 2651 | 2746 | | | | |
| Green Ave* | 2246 | 2934 | 2123 | 961 | 1709 | 2312 | 1370 | 2162 | 3307 | 1164 | 2581 | 2373 | 1704 | 1177 | | 4003 |
| Trial Mean [§] | 2214 | 3145 | 2177 | 986 | 1811 | 2385 | 1504 | 2250 | 3585 | 1174 | 2702 | 2577 | 1734 | 2798 | | 4023 |
| LSD (0.05)[§] | 310 | 639 | NS | 144 | NS | NS | 70 | 288 | 479 | 298 | NS | NS | 483 | NS | | 1110 |
| CV (%)[§] | 10 | 14 | 7 | 10 | 11 | 14 | 16 | 9.04 | 8 | 18 | 14 | 29 | 20 | 32 | | 19.51 |

*Average values brought from Tables 6 and 12 for yellow and green pea, respectively. [§]Indicate results when both green and yellow dry peas combined and analyzed together.

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Table 17. Statewide Dry Pea Variety Evaluations – 2009 – 2016 Multi-year Grain Yield Summary (lb/ac)...continued

| Varieties | Corvallis | | | | | | | | Creston | | | | | | | |
|-------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------|------|------|-------------|-------------|-------------|-------------|-------------|
| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Yellow Pea | | | | | | | | | | | | | | | | |
| AC Agassiz | | | | 2812 | 1902 | 1066 | 2169 | 3535 | | | | 2282 | | 4868 | 1172 | 6274 |
| Bridger | | | 1862 | 3170 | 2525 | 1593 | | 2382 | | | | 3747 | 4440 | 4632 | | 5201 |
| Delta | 3276 | 3671 | 1674 | 2987 | 2594 | | 2410 | 2519 | | | | 3352 | 4020 | | 889 | 5143 |
| DS Admiral | 2882 | 2941 | 1770 | 2518 | 2385 | 1622 | 2396 | 3005 | | | | 3468 | 1065 | 5018 | 1192 | 5699 |
| Montech 4152 | | | 1946 | 2899 | 2096 | 1395 | | | | | | 4017 | 4346 | 5009 | | |
| Spider | | | 2155 | 2899 | 1503 | | | | | | | 3657 | 4440 | 4890 | | 5204 |
| SW Midas | 2828 | 4029 | 1998 | 3064 | 2333 | 1495 | | | | | | 3340 | 3912 | 4888 | | |
| Yellow Ave* | 3057 | 3590 | 1865 | 2907 | 2306 | 1350 | 2405 | 2692 | | | | 3494 | 4404 | 5016 | 1144 | 5414 |
| Green Pea | | | | | | | | | | | | | | | | |
| Arcadia | | | 2272 | 3029 | 2704 | 1295 | 2499 | | | | | 3545 | 4701 | 4283 | 1155 | |
| CDC Striker | 3144 | 3068 | 1866 | 2375 | 2053 | 1354 | 1960 | | | | | 3126 | 3391 | 3934 | 1137 | |
| Cruiser | 3046 | 3144 | 1967 | 2562 | 1543 | 1384 | | 2631 | | | | 2763 | 3150 | 4605 | | 4737 |
| K2 | | | 1894 | 2470 | 2000 | | | | | | | 2982 | 3418 | | | |
| Majoret | 3278 | 3812 | 1641 | 2447 | 1439 | 1570 | 2136 | 1710 | | | | 3082 | 4303 | 4430 | 1243 | 5024 |
| Stirling | 3144 | 3525 | 1475 | | | | | | | | | 3278 | | | | |
| Green Ave* | 3173 | 3313 | 1750 | 2630 | | 1380 | 2327 | 2258 | | | | 3129 | 3907 | 4462 | 1142 | 4717 |
| Trial Mean [§] | 3101 | 3483 | 1801 | 2779 | 2203 | 1362 | 2376 | 2551 | | | | 3326 | 4215 | 4814 | 1098 | 5193 |
| LSD (0.05) [§] | 627 | 495 | NS | 1057 | 950 | NS | NS | 733 | | | | 598 | 498 | 710 | 393 | 888 |
| CV (%) [§] | 14 | 10 | 23 | 14 | 30 | 17 | 31 | 20.32 | | | | 12.59 | 8.36 | 10.43 | 25.32 | 12.10 |

*Average values brought from Tables 6 and 12 for yellow and green pea, respectively. [§]Indicate results when both green and yellow dry peas combined and analyzed together.

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Table 17. Statewide Dry Pea Variety Evaluations – 2009 – 2016 Multi-year Grain Yield Summary (lb/ac)...continued

| Varieties | Havre | | | | | | | | Huntley (Dry) | | | | | | | |
|-------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|
| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Yellow Pea | | | | | | | | | | | | | | | | |
| AC Agassiz | | | 2236 | 1965 | 2027 | 2215 | 1479 | 2537 | | | | 1965 | | 1144 | 1616 | |
| Bridger | | | 2149 | 1837 | 2127 | 1920 | 1561 | 2065 | | | 2360 | 1975 | 2687 | 892 | 1447 | 536 |
| Delta | 2446 | 3600 | 2139 | 2222 | 1700 | | 1793 | 2132 | 2542 | 2517 | 1904 | 1414 | 2648 | | 1635 | 829 |
| DS Admiral | 2331 | 3325 | 2102 | 1798 | 2008 | 2592 | 1897 | 2562 | 2669 | 2743 | 2128 | 1261 | 2840 | 1223 | 1733 | 716 |
| Montech 4152 | | 3505 | 2266 | 2146 | 1828 | 2056 | | | | | 2337 | 1491 | 2637 | 1103 | | |
| Spider | | | 2071 | 1903 | 1734 | 1953 | 1526 | 2259 | | | 2283 | 1220 | 2710 | 1012 | 1547 | 874 |
| SW Midas | 2314 | 3348 | 2111 | 1729 | 2033 | 2100 | | | 2329 | 2760 | 2106 | 1855 | 2745 | 1151 | | |
| Yellow Ave* | 2340 | 3495 | 2173 | 2039 | 2032 | 2228 | 2199 | 2438 | 2591 | 2773 | 2065 | 1630 | 2707 | 1126 | 1644 | 692 |
| Green Pea | | | | | | | | | | | | | | | | |
| Arcadia | | | 2405 | 1930 | 2598 | 1817 | 1782 | 2479 | | | 2224 | 1639 | | 956 | 1617 | 541 |
| CDC Striker | 2154 | 3222 | 2012 | 1953 | 1571 | 1833 | 1528 | | 2417 | 2556 | 1568 | 1128 | | 986 | 1541 | |
| Cruiser | 2254 | 3194 | 2286 | 1735 | 1669 | 1856 | 2008 | | 2520 | 2575 | 1998 | 1232 | 2566 | 991 | | |
| K2 | | | 1576 | 1463 | 1650 | 1773 | | | | | 2092 | 1525 | | 821 | | |
| Majoret | 2352 | 3451 | 1612 | 1685 | 2193 | 2105 | 1822 | 2459 | 2501 | 2945 | 1660 | 1331 | | 1128 | 1307 | 693 |
| Stirling | 2327 | 3274 | 1915 | 2122 | | | | | 2633 | 2874 | 1527 | 1942 | | | | |
| Green Ave* | 2252 | 3241 | 1987 | 1874 | 2011 | 2080 | 1806 | 2265 | 2471 | 2632 | 1729 | 1482 | 2442 | 1042 | 1581 | 667 |
| Trial Mean [§] | 2306 | 3397 | 2069 | 1968 | 2022 | 2170 | 1776 | 2370 | 2545 | 2719 | 1878 | 1556 | 2634 | 1096 | 1623 | 683 |
| LSD (0.05) [§] | 290 | 325 | NS | 309 | 447 | 294 | 285 | 284 | 274 | NS | NS | NS | 300 | 295 | NS | 245 |
| CV (%) [§] | 9 | 7 | 13 | 11 | 14 | 10 | 11 | 8.47 | 8 | 12 | 20 | 29 | 8 | 19 | 15 | 25.32 |

*Average values brought from Tables 6 and 12 for yellow and green pea, respectively. §Indicate results when both green and yellow dry peas combined and analyzed together.

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Table 17. Statewide Dry Pea Variety Evaluations – 2009 – 2016 Multi-year Grain Yield Summary (lb/ac)...continued

| Varieties | Joplin | | | | | | | | Moccasin | | | | | | | |
|--------------------------|-------------|------------|-------------|------|------|------|------|------|-------------|-------------|------------|-------------|-------------|-------------|-------------|-------------|
| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Yellow Pea | | | | | | | | | | | | | | | | |
| AC Agassiz | | | | | | | | | 2855 | 1123 | 1100 | 559 | 2220 | 2287 | 1545 | |
| Bridger | | | 773 | 1387 | | | | | 2981 | 1160 | 1064 | 1826 | 2176 | | 1275 | |
| Delta | 2491 | 775 | 1454 | | | | | | 1177 | 3139 | 963 | 1313 | 1899 | 2644 | 1405 | |
| DS Admiral | 2236 | 1012 | 1299 | | | | | | 1158 | 2642 | 999 | 1295 | 1835 | 2213 | 2731 | 1428 |
| Montech 4152 | | 1040 | 1679 | | | | | | 2533 | 1018 | 1084 | 1791 | 2176 | | | |
| Spider | | 908 | 1202 | | | | | | 2572 | 1005 | 1252 | 1750 | 2069 | 2702 | 1392 | |
| SW Midas | 2371 | 1060 | 1702 | | | | | | 903 | 2603 | 1031 | 1165 | 1557 | 2019 | | |
| Yellow Ave* | 2365 | 969 | 1454 | | | | | | 1058 | 2796 | 992 | 1241 | 1678 | 2165 | 2654 | 1445 |
| Green Pea | | | | | | | | | | | | | | | | |
| Arcadia | | 1142 | 2017 | | | | | | | 978 | 1186 | 1655 | 2010 | 2333 | 1186 | |
| CDC Striker | 2016 | 606 | 1517 | | | | | | 1066 | 2427 | 774 | 1193 | 1753 | 2156 | 2212 | |
| Cruiser | 2162 | 977 | 1517 | | | | | | 1001 | 2680 | 988 | 1123 | 1502 | 1860 | 1155 | |
| K2 | | 748 | 1457 | | | | | | 2436 | 851 | 1457 | 1259 | 1780 | | | |
| Majoret | 2514 | 465 | 1688 | | | | | | 1091 | 2608 | 848 | 1027 | 1584 | 2054 | 2867 | 1265 |
| Stirling | 2630 | 1257 | 1854 | | | | | | 1136 | 2907 | 838 | 1392 | | | | |
| Green Ave* | 2259 | 790 | 1686 | | | | | | 1091 | 2665 | 887 | 1200 | 1594 | 2029 | 2505 | 1303 |
| Trial Means [§] | 2324 | 870 | 1570 | | | | | | 1071 | 2754 | 934 | 1224 | 1640 | 2113 | 2603 | 3160 |
| LSD (0.05) [§] | 562 | NS | NS | | | | | | 208 | 203 | 120 | NS | 291 | 245 | 412 | 1023 |
| CV (%) [§] | 17 | 46 | 23 | | | | | | 12 | 5 | 9 | 16 | 13 | 8 | 11 | 22.89 |

*Average values brought from Tables 6 and 12 for yellow and green pea, respectively. [§]Indicate results when both green and yellow dry peas combined and analyzed together.

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Table 17. Statewide Dry Pea Variety Evaluations – 2009 – 2016 Multi-year Grain Yield Summary (lb/ac)...continued

| Varieties | Richland | | | | | | | | Sidney dryland | | | | | | | |
|-------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------|-------------|-------------|-------------|------|-------------|------|-------------|
| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Yellow Pea | | | | | | | | | | | | | | | | |
| AC Agassiz | | | 2224 | 3242 | 4107 | 1359 | 1596 | 5538 | | | | 1619 | | 2436 | | 3915 |
| Bridger | | 3295 | 2494 | 3878 | 3323 | 1145 | 1875 | 5791 | | | 2998 | 1249 | | 1983 | | 3865 |
| Delta | 2015 | 3226 | 1501 | 3706 | 3573 | | 1923 | 5459 | 1887 | 3105 | 2662 | 1464 | | | | 3628 |
| DS Admiral | 2018 | 3264 | 1664 | 3564 | 3645 | 1153 | 1735 | 5166 | 1757 | 3016 | 2517 | 1158 | | 2693 | | 3591 |
| Montech 4152 | | | 1809 | 3409 | 3786 | 1216 | | | | | 2463 | 1586 | | 2521 | | |
| Spider | | 2731 | 1910 | 1252 | 3959 | 1296 | 1859 | 5428 | | | 2504 | 1297 | | | | |
| SW Midas | 1435 | 2321 | 2166 | 2983 | 3873 | 1034 | | 5112 | 1511 | 3639 | 2589 | 1571 | | 2909 | | 3715 |
| Yellow Ave* | 1855 | 2999 | 1855 | 3566 | 3807 | 1200 | 1908 | 5541 | 1884 | 3489 | 2502 | 1421 | | 2604 | | 3924 |
| Green Pea | | | | | | | | | | | | | | | | |
| Arcadia | | | 1494 | 3143 | 3777 | 1182 | 2273 | 5865 | | | 2772 | 1302 | | 2575 | | 3783 |
| CDC Striker | 1918 | 2976 | 1732 | 3270 | 2914 | 1125 | 1652 | | 1988 | 3408 | 2212 | 1122 | | 2594 | | |
| Cruiser | 1797 | 2642 | 1684 | 3010 | 3289 | 998 | | 5291 | 1806 | 2820 | 2223 | 1202 | | 2440 | | 3294 |
| K2 | | 2721 | 1772 | 3476 | 2803 | | | | | 2751 | 2296 | 1435 | | | | 3468 |
| Majoret | 2221 | 2981 | 1653 | 3078 | 3022 | 1275 | 1873 | 4897 | 2080 | 3342 | 2233 | 1336 | | | | 3819 |
| Stirling | 1565 | 2566 | 1493 | 3725 | | | | | 1658 | 3052 | 2601 | 2041 | | | | |
| Green Ave* | 1927 | 2798 | 1628 | 3410 | 3440 | 1127 | 1907 | 5166 | 1898 | 3104 | 2341 | 1406 | | 2515 | | 3571 |
| Trial Mean [§] | 1882 | 2922 | 1729 | 3501 | 3622 | 1172 | 1908 | 5416 | 1964 | 3341 | 1659 | 1414 | | 2569 | | 3784 |
| LSD (0.05) [§] | 577 | NS | 289 | NS | 777 | NS | NS | 737 | 301 | 792 | NS | 465 | | NS | | 572 |
| CV (%) [§] | 21 | 13 | 10 | 16 | 15 | 30 | 17 | 9.62 | 9 | 9 | 14 | 20 | | 13 | | 10.69 |

*Average values brought from Tables 6 and 12 for yellow and green pea, respectively. [§]Indicate results when both green and yellow dry peas combined and analyzed together.

Table 18. Claims and/or Resistance of Commercial Pea Varieties

(This table is claims made by the breeding programs and/or commercial dealers and is not based on research conducted by MAES or EARC).

| Variety* | Powdery Mildew Resistant ¹ | Lodging Resistant ² | Height | <i>Fusarium</i> Resistance ³ | Bleach Resistant ⁴ | Maturity |
|--------------|---------------------------------------|--------------------------------|--------|---|-------------------------------|----------|
| AC Agassiz | X | X | | | | |
| Aragorn | | X | | | X | Med |
| Arcadia | X | X | | | | Early |
| Banner | | X | | | | Early |
| Bluemoon | X | X | Tall | | | Med |
| Bridger | X | X | Tall | | | Early |
| CDC Striker | | | Med | | | Med |
| CDC Treasure | X | X | | | | |
| Cruiser | | X | | X | | Med |
| Daytona | X | X | Tall | | | Med |
| Delta | | | | X | | |
| DS Admiral | X | X | | | | Early |
| Jet Set | X | X | | | | Med |
| K2 | X | X | | | X | Early |
| Korando | | | | | | Early |
| Majoret | | X | | | | Med |
| Montech 4152 | | | Tall | | | |
| Navarro | X | X | | | | Early |
| Spider | X | X | | | | Med |
| SW Midas | X | X | | | | Early |
| Trapeze | X | X | Med | | | Early |

¹Varieties exhibit above average resistance to Powdery Mildew; ²Varieties have above average resistance to lodging;

³Varieties are resistant to *Fusarium*; ⁴Varieties are resistant to bleaching; *Because some of the breeding entries have not been registered and released as varieties and lack of information for others, this table is not complete and inclusive.

Western Regional Dry Pea Variety Evaluation

The Western Regional dry pea variety evaluation trial was conducted at two locations (Havre and Richland). The trial consisted of six yellow and seven green dry pea advanced breeding lines and varieties at Havre site; and 11 yellow and seven green dry pea advanced breeding lines and varieties at Richland site. Most of the advanced breeding lines and varieties were obtained from the USDA-ARS Grain Legume Genetics and Physiology Program in Pullman, Washington.

The yellow pea average yield was 2936 lb/ac at Havre and 4938 lb/ac at Richland (Tables 19 - 20). Similarly, the average green pea yield was 2932 lb/ac at Havre and 4892 lb/ac at Richland (Tables 19 - 20). For the respective testing site, the mean grain yields for yellow and green pea were almost the same.

Table 19. Western Regional Dry Pea Variety Evaluation – Havre, MT in 2016

| Variety/lines | Adjusted grain yield (lb/ac) | No. of days to flowering | Plant height (cm) | TKW (gm) | Test wt (lb/bu) |
|-------------------|------------------------------|--------------------------|-------------------|-------------------|-----------------|
| Yellow | | | | | |
| DS Admiral | 2689 | 57 | 52 | 238 | 60.85 |
| PS07100925 | 3005 | 57 | 36 | 242 | 60.70 |
| PS081004 | 3227 | 58 | 42 | 247 | 60.73 |
| PS08101022 | 2901 | 54 | 46 | 240 | 61.58 |
| PS12100111 | 3075 | 56 | 37 | 219 | 61.93 |
| SS-41 | 2722 | 60 | 40 | 179 | 60.90 |
| <i>Mean</i> | 2936 | 57 | 42 | 228 | 61.11 |
| <i>P-value</i> | 0.0097 | <0.0001 | 0.0108 | <0.0001 | 0.0045 |
| <i>LSD (0.05)</i> | 327 | 0.8 | 7 | 5.4 | 0.58 |
| <i>C.V (%)</i> | 7.40 | 0.88 | 12.40 | 1.68 | 0.68 |
| Green | | | | | |
| Hampton | 3069 | 60 | 38 | 226 | 60.80 |
| PS03101445 | 2982 | 58 | 38 | 216 | 60.78 |
| PS05100840 | 3029 | 60 | 33 | 234 | 60.30 |
| PS08100133 | 3017 | 59 | 41 | 220 | 60.95 |
| PS10100131 | 2430 | 57 | 43 | 227 | 60.65 |
| PS10100158 | 2904 | 60 | 38 | 191 | 60.83 |
| PS10100558 | 3091 | 59 | 45 | 216 | 61.08 |
| <i>Mean</i> | 2932 | 59 | 39 | 219 | 60.77 |
| <i>P-value</i> | 0.0024 | <0.0001 | 0.0239 | <0.0001 | 0.5357 |
| <i>LSD (0.05)</i> | 257 | 0.9 | 7 | 5.80 | Ns |
| <i>C.V (%)</i> | 5.91 | 0.99 | 12.82 | 1.81 | 0.76 |

Table 20. Western Regional Dry Pea Variety Evaluation – Richland, MT in 2016

| Variety/lines | Adjusted grain yield (lb/ac) | Plant height (cm) | TKW (gm) | Test wt (lb/bu) |
|-------------------|------------------------------|-------------------|----------|-----------------|
| Yellow | | | | |
| DS Admiral | 4554 | 97 | | 64.00 |
| PS07100925 | 4971 | 90 | | 64.08 |
| PS081004 | 5291 | 104 | | 63.70 |
| PS08101022 | 5616 | 99 | | 63.65 |
| PS12100111 | 4941 | 87 | | 64.93 |
| PS14100068 | 5024 | 88 | | 64.85 |
| PS14100069 | 4797 | 99 | | 64.08 |
| PS1514BNZ244 | 5251 | 92 | | 63.03 |
| PS1514BNZ300 | 4269 | 89 | | 64.48 |
| PS1514BNZ400 | 5042 | 87 | | 64.33 |
| SS-41 | 4565 | 89 | | 63.00 |
| <i>Mean</i> | 4938 | 93 | | 64.01 |
| <i>P-value</i> | 0.0010 | 0.1574 | | 0.0010 |
| <i>LSD (0.05)</i> | 524 | <i>Ns</i> | | 0.85 |
| <i>C.V (%)</i> | 7.35 | 9.88 | | 0.93 |
| Green | | | | |
| Hampton | 4706 | 91 | | 62.98 |
| PS03101445 | 5399 | 93 | | 64.33 |
| PS05100840 | 4813 | 79 | | 63.53 |
| PS08100133 | 5161 | 95 | | 63.85 |
| PS10100131 | 4071 | 89 | | 63.80 |
| PS10100158 | 4872 | 89 | | 63.98 |
| PS10100558 | 5228 | 101 | | 63.85 |
| Mean | 4892 | 90 | | 63.75 |
| <i>P-value</i> | 0.0005 | 0.0775 | | 0.0592 |
| <i>LSD (0.05)</i> | 450 | <i>Ns</i> | | <i>Ns</i> |
| <i>C.V (%)</i> | 6.20 | 9.54 | | 0.80 |

Lentil

Statewide Lentil Variety Evaluation

The Statewide lentil variety evaluation trial was conducted at 10 sites. The tested entries include three medium green, 3 small green and 2 small red lentils with a total of eight entries.

Lentil grain yield

Substantial yield differences were recorded from site to site. The mean grain yield for the different locations ranged from 295 lb/ac to 2894 lb/ac (Table 22). Average lentil yields were 1315 lb/ac at Bozeman, 2636 lb/ac at Conrad, 1066 lb/ac at Corvallis, 2894 lb/ac at Creston, 2869 lb/ac at Havre, 295 lb/ac at Huntley (dry), 1489 lb/ac at Huntley (irrigated), 1326 lb/ac at Moccasin, 1567 lb/ac at Richland and 2200 lb/ac at Sidney dryland. The differences in grain yield among varieties within a site were significant in most cases (Table 22).

Lentil TKW

Thousand kernel weight (TKW) data were measured at two locations only (Table 23). These TKW mean data showed significance differences among varieties for a location (Table 23).

Lentil test weight

Test weight varied from site to site. The test weight of the varieties within a site were significant for all sites except Huntley irrigated (Table 24). The mean test weight ranged from 57.86 lb/bu measured at Conrad to 65.26 lb/bu recorded at Bozeman (Table 24).

Lentil plant height

The mean plant height ranged from 33 cm recorded at Bozeman to 61 cm at Creston (Table 25). Plant height differences among varieties in a site were significant in some of the sites.

Lentil number of days to flowering

The number of days to flowering ranged from 60 to 76 days (Table 26). Recording the number of days to flowering was reported to be difficult for lentil in some of the testing sites since lentil keeps on flowering depends on soil moisture availability even during harvesting. Like dry pea, the longest flowering date was recorded from Moccasin compared with other sites.

Table 21. Lentil Variety Sources and Characteristics

| Variety* | Type | Maturity ¹ | Breeding Program ² | Release Date |
|----------------------|-------|-----------------------|-------------------------------|--------------|
| Large Green | | | | |
| CDC Greenland | Green | Mod | CDC | 2006 |
| Merrit | Green | | | |
| Riveland | Green | | | |
| Medium Green | | | | |
| Avondale | Green | | | |
| CDC Richlea | Green | | | |
| Imi-Green | Green | | | |
| Impress CL | Green | | | |
| Essex | | | | |
| NDL080141 | | | | |
| Small Green | | | | |
| Eston | Green | | | |
| LC07ND055E | Green | | | |
| NDLO90298E | Green | | | |
| Viceroy | Green | | | |
| Small Red | | | | |
| Crimson | Red | Mod | USDA | 1990 |
| CDC Impact | Red | | | |
| CDC Impala CL | Red | | | |
| CDC Red Coats | Red | | | |
| CDC Redberry | Red | Mod | CDC | 2004 |
| NDL090413T | Red | Late | NDSU | |
| Spanish Brown | | | | |
| Morena | brown | | | |
| Pardina | brown | | | |

¹Compared to trial means; ² Refers to developer: CDC = Crop Development Centre, University of Saskatchewan; NDSU = North Dakota State University; USDA = USDA-ARS Grain Legume Genetics and Physiology Research.

*Because some of the breeding entries have not been registered and released as varieties and companies did not provide detail variety information. Therefore, the variety characteristics in this table is not complete and inclusive.

Table 22. Montana Statewide Lentil Variety Evaluations – Grain Yield (lb/ac) in 2016

| Variety/lines | Bozeman | Conrad | Corvallis (Irri.) | Creston | Havre | Huntley (Dry)* | Huntley (Irri.) | Moccasin | Richland | Sidney (Dry) |
|---------------------|-------------------|-------------------|-------------------|---------------|---------------|----------------|-----------------|---------------|-------------------|---------------|
| Large Green | | | | | | | | | | |
| Medium Green | | | | | | | | | | |
| Avondale | 1238 | 2226 | 927 | 2992 | 3170 | 133 | 1203 | 1445 | 1678 | 2315 |
| CDC Richlea | 1522 | 3288 | 1299 | 2674 | 2991 | 315 | 1988 | 1513 | 1346 | 2325 |
| CDC Imi-Green | 1121 | 1491 | 1095 | 2215 | 2507 | 110 | 1576 | 1154 | 1035 | 1851 |
| Small Green | | | | | | | | | | |
| CDC Invincible CL | 1175 | 3033 | 1219 | 2740 | 2993 | 414 | 1718 | 1354 | 1204 | 2353 |
| Eagle | 1000 | 2310 | 1334 | 3318 | 2478 | 509 | 1150 | 1256 | 1799 | 2425 |
| CDC Viceroy | 1276 | 3059 | 789 | 3020 | 3160 | 280 | 1201 | 1324 | 1673 | 2392 |
| Small Brown | | | | | | | | | | |
| Small Red | | | | | | | | | | |
| CDC Impala CL | 1955 | 2986 | 828 | 3044 | 2678 | 312 | 1659 | 1313 | 1589 | 1694 |
| CDC Redcoats | 1236 | 2701 | 1041 | 3153 | 2979 | 291 | 1418 | 1248 | 2214 | 2253 |
| <i>Mean</i> | <i>1315</i> | <i>2636</i> | <i>1066</i> | <i>2894</i> | <i>2869</i> | <i>295</i> | <i>1489</i> | <i>1326</i> | <i>1567</i> | <i>2200</i> |
| <i>P-Value</i> | <i><0.0001</i> | <i><0.0001</i> | <i>0.0513</i> | <i>0.0043</i> | <i>0.0005</i> | | <i>0.3438</i> | <i>0.0477</i> | <i><0.0001</i> | <i>0.6894</i> |
| <i>LSD (0.05)0</i> | <i>217</i> | <i>550</i> | <i>Ns</i> | <i>460</i> | <i>301</i> | | <i>Ns</i> | <i>233</i> | <i>231</i> | <i>Ns</i> |
| <i>CV (%)</i> | <i>9.43</i> | <i>14.20</i> | <i>32.99</i> | <i>10.80</i> | <i>7.14</i> | | <i>23.06</i> | <i>11.97</i> | <i>10.05</i> | <i>25.70</i> |

*Results from Huntley dryland are from one replication only.

Table 23. Montana Statewide Lentil Variety Evaluations – Thousand Kernel Weight (TKW) (in g) in 2016

| Variety/lines | Bozeman | Conrad | Corvallis (Irri.) | Creston | Havre | Huntley (Dry) | Huntley (Irri.) | Moccasin | Richland | Sidney (Dry) |
|---------------------|---------|--------|----------------------|-------------------|-------------------|------------------|--------------------|----------|----------|-----------------|
| Large Green | | | | | | | | | | |
| Medium Green | | | | | | | | | | |
| Avondale | | | 46 | 43 | 53 | | | | | |
| CDC Richlea | | | 52 | 46 | 56 | | | | | |
| CDC Imi-Green | | | 57 | 54 | 59 | | | | | |
| Small Green | | | | | | | | | | |
| CDC Invincible CL | | | 33 | 31 | 30 | | | | | |
| Eagle | | | 38 | 35 | 41 | | | | | |
| CDC Viceroy | | | 34 | 31 | 31 | | | | | |
| Small Brown | | | | | | | | | | |
| Small Red | | | | | | | | | | |
| CDC Impala CL | | | 31 | 29 | 29 | | | | | |
| CDC Redcoats | | | 40 | 38 | 38 | | | | | |
| <i>Mean</i> | | | 41.3 | 38.3 | 42.1 | | | | | |
| <i>P-Value</i> | | | <0.0001 | <0.0001 | <0.0001 | | | | | |
| <i>LSD (0.05)</i> | | | 2.1 | 1.9 | 1.8 | | | | | |
| <i>CV (%)</i> | | | 3.63 | 3.48 | 2.96 | | | | | |

Table 24. Montana Statewide Lentil Variety Evaluations – Test Weight (lb/bu) in 2016

| Variety/lines | Bozeman | Conrad | Corvallis (Irri.) | Creston | Havre | Huntley* (Dry) | Huntley (Irri.) | Moccasin | Richland | Sidney (Dry) |
|---------------------|-------------------|-------------------|-------------------|-------------------|-------------------|----------------|-----------------|-------------------|-------------------|---------------|
| Large Green | | | | | | | | | | |
| Medium Green | | | | | | | | | | |
| Avondale | 64.17 | 58.52 | 61.30 | 62.25 | 62.80 | 61.10 | 58.30 | 62.90 | 62.32 | 62.97 |
| CDC Richlea | 63.90 | 57.63 | 60.40 | 61.25 | 61.80 | 60.60 | 57.50 | 62.65 | 65.67 | 61.88 |
| CDC Imi-Green | 63.70 | 48.75 | 59.42 | 61.03 | 62.05 | 60.80 | 58.25 | 61.98 | 57.50 | 62.00 |
| Small Green | | | | | | | | | | |
| CDC Invincible CL | 66.30 | 60.00 | 63.80 | 64.45 | 64.18 | 63.70 | 61.40 | 64.65 | 64.45 | 63.10 |
| Eagle | 65.10 | 57.40 | 63.40 | 63.50 | 64.05 | 63.70 | 59.00 | 64.33 | 64.55 | 64.05 |
| CDC Viceroy | 66.47 | 61.25 | 63.93 | 64.33 | 64.50 | 63.70 | 61.30 | 65.08 | 64.65 | 64.90 |
| Small Brown | | | | | | | | | | |
| Small Red | | | | | | | | | | |
| CDC Impala CL | 66.70 | 61.20 | 64.38 | 65.18 | 65.28 | 64.30 | 62.85 | 65.43 | 65.60 | 63.80 |
| CDC Redcoats | 65.73 | 58.10 | 62.97 | 64.03 | 64.10 | 63.60 | 60.10 | 64.93 | 65.67 | 64.68 |
| <i>Mean</i> | <i>65.26</i> | <i>57.86</i> | <i>62.34</i> | <i>63.25</i> | <i>63.59</i> | <i>62.59</i> | <i>59.84</i> | <i>63.99</i> | <i>63.13</i> | <i>63.42</i> |
| <i>P-Value</i> | <i><0.0001</i> | <i><0.0001</i> | <i><0.0001</i> | <i><0.0001</i> | <i><0.0001</i> | | <i>0.1136</i> | <i><0.0001</i> | <i><0.0001</i> | <i>0.0146</i> |
| <i>LSD (0.05)</i> | <i>0.56</i> | <i>3.01</i> | <i>0.84</i> | <i>0.39</i> | <i>0.34</i> | | <i>Ns</i> | <i>0.76</i> | <i>1.39</i> | <i>1.78</i> |
| <i>CV (%)</i> | <i>0.49</i> | <i>3.63</i> | <i>0.96</i> | <i>0.42</i> | <i>0.37</i> | | <i>2.59</i> | <i>0.80</i> | <i>1.50</i> | <i>1.98</i> |

*Results from Huntley dryland are from one replication only.

Table 25. Montana Statewide Lentil Variety Evaluations – Plant Height (cm) in 2016

| Variety/lines | Bozeman | Conrad | Corvallis (Irri.) | Creston | Havre | Huntley (Dry)* | Huntley (Irri.) | Moccasin | Richland | Sidney (Dry) |
|---------------------|---------------|--------|-------------------|---------------|---------------|----------------|-----------------|-------------------|---------------|---------------|
| Large Green | | | | | | | | | | |
| Medium Green | | | | | | | | | | |
| Avondale | 33 | | 14 | 55 | 38 | 34 | 39 | 31 | 48 | 27 |
| CDC Richlea | 28 | | 16 | 61 | 36 | 31 | 36 | 28 | 48 | 29 |
| CDC Imi-Green | 37 | | 19 | 66 | 43 | 25 | 36 | 37 | 59 | 29 |
| Small Green | | | | | | | | | | |
| CDC Invincible CL | 32 | | 16 | 57 | 31 | 30 | 37 | 26 | 43 | 24 |
| Eagle | 34 | | 15 | 62 | 33 | 27 | 31 | 27 | 39 | 26 |
| CDC Viceroy | 35 | | 13 | 65 | 34 | 24 | 38 | 27 | 46 | 28 |
| Small Brown | | | | | | | | | | |
| Small Red | | | | | | | | | | |
| CDC Impala CL | 31 | | 16 | 59 | 32 | 32 | 37 | 26 | 42 | 26 |
| CDC Redcoats | 33 | | 16 | 59 | 33 | 27 | 27 | 29 | 51 | 26 |
| Mean | 33 | | 15 | 61 | 35 | 29 | 35 | 29 | 47 | 27 |
| P-Value | 0.0746 | | 0.0061 | 0.0942 | 0.0004 | | 0.0450 | <0.0001 | 0.0127 | 0.5706 |
| LSD (0.05) | Ns | | 1.9 | Ns | 4.1 | | 7.8 | 1.3 | 8.9 | Ns |
| CV (%) | 7.99 | | 9.17 | 12.97 | 8.16 | | 9.49 | 3.08 | 12.90 | 14.06 |

*Results from Huntley dryland are from one replication only.

Table 26. Montana Statewide Lentil Variety Evaluations – Number of Days to Flowering in 2016

| Variety/lines | Bozeman | Conrad | Corvallis [‡] (Irri.) | Creston* | Havre | Huntley (Dry) | Huntley (Irri.) | Moccasin | Richland | Sidney (Dry) |
|---------------------|---------|---------------|-----------------------------------|-----------|-------------------|------------------|--------------------|-------------------|----------|-----------------|
| Large Green | | | | | | | | | | |
| Medium Green | | | | | | | | | | |
| Avondale | | 65 | 71 | 80 | 58 | | | 74 | | 66 |
| CDC Richlea | | 63 | 71 | 80 | 59 | | | 75 | | 67 |
| CDC Imi-Green | | 65 | 71 | 80 | 59 | | | 76 | | 67 |
| Small Green | | | | | | | | | | |
| CDC Invincible CL | | 64 | 71 | 80 | 61 | | | 77 | | 67 |
| Eagle | | 64 | 71 | 80 | 58 | | | 75 | | 67 |
| CDC Viceroy | | 66 | 71 | 80 | 61 | | | 77 | | 68 |
| Small Brown | | | | | | | | | | |
| Small Red | | | | | | | | | | |
| CDC Impala CL | | 63 | 71 | 80 | 62 | | | 77 | | 67 |
| CDC Redcoats | | 66 | 71 | 80 | 61 | | | 76 | | 68 |
| <i>Mean</i> | | 64 | 71 | 80 | 60 | | | 76 | | 67 |
| <i>P-Value</i> | | 0.0048 | | | <0.0001 | | | <0.0001 | | 0.5053 |
| <i>LSD (0.05)</i> | | 3.5 | | | 0.7 | | | 1 | | <i>Ns</i> |
| <i>CV (%)</i> | | 3.71 | | | 0.80 | | | 0.95 | | 1.81 |

[‡]All varieties in all replications flower the same day.*All varieties in all replications flower the same day.

Multi-Year and Multi-Location Statewide Lentil Variety Evaluation Summary

Table 27. Statewide Lentil Variety Evaluations – 2009 – 2016 Multi-year grain yield summary (lb/ac)

| Variety | Bozeman | | | | | | | | Conrad | | | | | | | |
|---------------------|-------------|-------------|-------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|-------------|
| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Small Green | | | | | | | | | | | | | | | | |
| Essex | | 2111 | 1538 | 462 | | 1839 | | | 3248 | 436 | 2842 | 1823 | | 1865 | | |
| Medium Green | | | | | | | | | | | | | | | | |
| Brewer | | 1855 | 1340 | 528 | | | | | 2272 | 381 | 2034 | 1120 | | | | |
| CDC Richlea | | 2266 | 1534 | 569 | 1400 | 1911 | 1113 | 1522 | 2831 | 623 | 2307 | 1800 | 1698 | 1752 | 665 | 3288 |
| Avondale | | 2224 | 1578 | 685 | 1745 | 1919 | 1083 | 1238 | 3113 | 687 | 2284 | 1696 | 1501 | 1597 | 535 | 2226 |
| Large Green | | | | | | | | | | | | | | | | |
| Merrit | | 2064 | 1360 | 607 | | 1444 | | | 2183 | 385 | 2151 | 1243 | | 1744 | | |
| Riveland | | 1825 | 1558 | 567 | | 1736 | | | 2127 | 324 | 1821 | 1464 | | 1616 | | |
| Small Red | | | | | | | | | | | | | | | | |
| Crimson | | 1999 | 1281 | 588 | 1424 | 1725 | | | 1921 | 544 | 1762 | 1543 | 1039 | 1590 | | |
| CDC Redberry | | 982 | 1400 | | 1348 | 1700 | | | 2234 | 833 | 2318 | 1338 | 1351 | 1869 | | |
| <i>Mean</i> | | <i>1953</i> | <i>1476</i> | <i>560</i> | <i>1363</i> | <i>1723</i> | <i>974</i> | <i>1315</i> | <i>2451</i> | <i>533</i> | <i>2227</i> | <i>1496</i> | <i>1460</i> | <i>1682</i> | <i>716</i> | <i>2636</i> |
| <i>LSD (0.05)</i> | | <i>382</i> | <i>138</i> | <i>98</i> | <i>167</i> | <i>NS</i> | <i>NS</i> | <i>217</i> | <i>559</i> | <i>214</i> | <i>NS</i> | <i>NS</i> | <i>236</i> | <i>NS</i> | <i>NS</i> | <i>550</i> |
| <i>CV (%)</i> | | <i>14</i> | <i>7</i> | <i>12</i> | <i>8</i> | <i>19</i> | <i>14</i> | <i>9</i> | <i>14</i> | <i>28</i> | <i>21</i> | <i>25</i> | <i>11</i> | <i>24</i> | <i>60</i> | <i>14</i> |
| Variety | Corvallis | | | | | | | | Creston | | | | | | | |
| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Small Green | | | | | | | | | | | | | | | | |
| Essex | 2224 | 1087 | | 536 | | 450 | | | 2395 | 2464 | 2091 | 1409 | | 1299 | | |
| Medium Green | | | | | | | | | | | | | | | | |
| Brewer | 940 | 964 | | 405 | | | | | 2460 | 2164 | 1464 | 1250 | | | | |
| CDC Richlea | 2552 | 973 | | 893 | 1330 | 471 | 1735 | 1299 | 2831 | 2150 | 1873 | 1625 | 1303 | 1753 | 969 | 2674 |
| Avondale | 2495 | 1052 | | 837 | 1387 | 528 | 1421 | 927 | 3016 | 2626 | 2024 | 1790 | 1244 | 1625 | 925 | 2992 |
| Large Green | | | | | | | | | | | | | | | | |
| Merrit | 1411 | 690 | | 394 | | 536 | | | 2829 | 1954 | 1730 | 1038 | | 1094 | | |
| Riveland | 1353 | 430 | | 552 | | 340 | | | 2478 | 1898 | 1547 | 1310 | | 710 | | |
| Small Red | | | | | | | | | | | | | | | | |
| Crimson | 1629 | 1095 | | 838 | 951 | 365 | | | 2082 | 2259 | 2095 | 1245 | 1238 | 1021 | | |
| CDC Redberry | 2411 | 1059 | | 706 | 795 | 540 | | | 2326 | 2346 | 2090 | | 1816 | 1851 | | |
| <i>Mean</i> | <i>1802</i> | <i>860</i> | | <i>700</i> | <i>1155</i> | <i>511</i> | <i>1366</i> | <i>1066</i> | <i>2522</i> | <i>2164</i> | <i>1822</i> | <i>1345</i> | <i>1347</i> | <i>1409</i> | <i>911</i> | <i>2894</i> |
| <i>LSD (0.05)</i> | <i>395</i> | <i>348</i> | | <i>354</i> | <i>222</i> | <i>NS</i> | <i>NS</i> | <i>NS</i> | <i>448</i> | <i>456</i> | <i>NS</i> | <i>421</i> | <i>279</i> | <i>136</i> | <i>NS</i> | <i>460</i> |
| <i>CV (%)</i> | <i>15</i> | <i>28</i> | | <i>36</i> | <i>13</i> | <i>35</i> | <i>32</i> | <i>33</i> | <i>12</i> | <i>15</i> | <i>22</i> | <i>22</i> | <i>14</i> | <i>28</i> | <i>26</i> | <i>11</i> |

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Table 27. Statewide Lentil Variety Evaluations – 2009 – 2016 Multi-year Grain Yield Summary (lb/ac)...continued

| Variety | Havre | | | | | | | | Huntley (Dry) | | | | | | | |
|---------------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|------|---------------|-------------|------------|------------|-------------|-------------|-------------|-------------|
| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016* |
| Small Green | | | | | | | | | | | | | | | | |
| Essex | 1654 | 3119 | 1838 | | | 2131 | | | 2103 | 464 | 784 | 569 | | 843 | | |
| Medium Green | | | | | | | | | | | | | | | | |
| Brewer | 1173 | 2487 | 1024 | 1121 | | | | | 494 | 425 | 402 | 583 | | | | |
| CDC Richlea | 1546 | 2853 | 1743 | 830 | 1530 | 1649 | 1081 | 2991 | 1603 | 569 | 873 | 734 | 1585 | 699 | 987 | 315 |
| Avondale | 1807 | 2790 | 1385 | 874 | 1483 | 1808 | 1046 | 3170 | 1916 | 926 | 877 | | 1767 | 718 | 1274 | 133 |
| Large Green | | | | | | | | | | | | | | | | |
| Merrit | 1331 | 2868 | 1127 | 977 | | 1306 | | | 947 | 466 | 717 | 523 | | 499 | | |
| Riveland | 1368 | 2463 | 968 | 1033 | | 1282 | | | 1814 | 399 | 717 | 727 | | 557 | | |
| Small Red | | | | | | | | | | | | | | | | |
| Crimson | 1072 | 2343 | 1705 | 902 | 625 | 1685 | | | 1629 | 738 | 458 | 607 | 1683 | 578 | | |
| CDC Redberry | 1217 | 2592 | 904 | 846 | 760 | 1440 | | | 2411 | 684 | 819 | 620 | 1956 | 412 | | |
| <i>Mean</i> | <i>1399</i> | <i>2736</i> | <i>1362</i> | <i>830</i> | <i>1123</i> | <i>1557</i> | <i>912</i> | 2869 | <i>1397</i> | <i>573</i> | <i>672</i> | <i>614</i> | <i>1690</i> | <i>650</i> | <i>1100</i> | <i>295</i> |
| <i>LSD (0.05)</i> | <i>302</i> | <i>340</i> | <i>299</i> | <i>179</i> | <i>173</i> | <i>352</i> | <i>27</i> | 301 | <i>NS</i> | <i>272</i> | <i>NS</i> | <i>167</i> | <i>NS</i> | <i>141</i> | <i>NS</i> | |
| <i>CV (%)</i> | <i>15</i> | <i>9</i> | <i>10</i> | <i>15</i> | <i>11</i> | <i>15</i> | <i>7</i> | 7 | <i>43</i> | <i>33</i> | <i>54</i> | <i>19</i> | <i>16</i> | <i>15</i> | <i>17</i> | |
| Variety | Joplin | | | | | | | | Moccasin | | | | | | | |
| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Small Green | | | | | | | | | | | | | | | | |
| Essex | | 2491 | 726 | 2521 | | | | | | 1743 | | 2036 | 918 | 809 | 1713 | |
| Medium Green | | | | | | | | | | | | | | | | |
| Brewer | | 2236 | 350 | 2027 | | | | | | 1768 | 730 | 756 | | | | |
| CDC Richlea | | 2371 | 616 | 1919 | | | | | | 2062 | 1100 | 958 | 1904 | 1672 | 952 | 1513 |
| Avondale | | | 581 | 2421 | | | | | | 1944 | 903 | 955 | 1859 | 1440 | 751 | 1445 |
| Large Green | | | | | | | | | | | | | | | | |
| Merrit | | 2549 | 546 | 2127 | | | | | | 1890 | 771 | 838 | | 1258 | | |
| Riveland | | | 247 | 2303 | | | | | | 1805 | 926 | 827 | | 1519 | | |
| Small Red | | | | | | | | | | | | | | | | |
| Crimson | | 2162 | 774 | 1479 | | | | | | 1919 | 911 | 907 | 1403 | 1087 | | |
| CDC Redberry | | 1973 | 785 | 1717 | | | | | | 1642 | 764 | | 1491 | 1456 | | |
| <i>Mean</i> | | <i>2324</i> | <i>624</i> | <i>2077</i> | | | | | | <i>1906</i> | <i>888</i> | <i>833</i> | <i>1538</i> | <i>1383</i> | <i>754</i> | <i>1326</i> |
| <i>LSD (0.05)</i> | | <i>562</i> | <i>NS</i> | <i>NS</i> | | | | | | <i>NS</i> | <i>NS</i> | <i>144</i> | <i>320</i> | <i>248</i> | <i>NS</i> | <i>233</i> |
| <i>CV (%)</i> | | <i>17</i> | <i>44</i> | <i>20</i> | | | | | | <i>11</i> | <i>24</i> | <i>12</i> | <i>15</i> | <i>13</i> | <i>27</i> | <i>12</i> |

*Yield is low due to hail damage and results are only from one replication.

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Table 27. Statewide Lentil Variety Evaluations – 2009 – 2016 Multi-year Grain Yield Summary (lb/ac)...continued

| Variety | Richland | | | | | | | | Sidney (Dry) | | | | | | | |
|---------------------|-------------|-------------|------------|-------------|-------------|------------|------------|-------------|--------------|-------------|-------------|------------|------|------------|------|-------------|
| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Small Green | | | | | | | | | | | | | | | | |
| Essex | 1181 | 1752 | 1097 | 1705 | | 441 | | | 1768 | 2251 | 1737 | 458 | | 1057 | | |
| Medium Green | | | | | | | | | | | | | | | | |
| Brewer | 939 | 1324 | 581 | 1882 | | | | | 1103 | 1423 | 1061 | 184 | | | | |
| CDC Richlea | 1596 | 1562 | 1077 | 1874 | 1914 | 755 | 1138 | 1346 | 1699 | 1959 | 1594 | 530 | | 1170 | | 2325 |
| Avondale | 1284 | 1850 | 1398 | 2041 | 2193 | 582 | 1075 | 1678 | 1653 | 2169 | 1774 | 453 | | 982 | | 2315 |
| Large Green | | | | | | | | | | | | | | | | |
| Merrit | 1098 | 1435 | 880 | 1710 | | 371 | | | 1407 | 1350 | 1418 | 222 | | 704 | | |
| Riveland | 1013 | 1571 | 836 | 1712 | | 398 | | | 1387 | 1564 | 1413 | 401 | | 821 | | |
| Small Red | | | | | | | | | | | | | | | | |
| Crimson | 1308 | 1222 | 859 | 1734 | 1573 | 287 | | | 836 | 1924 | 981 | 261 | | 947 | | |
| CDC Redberry | 1296 | 1390 | 933 | 1743 | 1582 | 524 | | | 1332 | 2186 | 1604 | 448 | | 867 | | |
| Mean | 1200 | 1537 | 945 | 1666 | 1896 | 479 | 999 | 1567 | 1351 | 1835 | 1444 | 371 | | 938 | | 2200 |
| LSD (0.05) | 288 | 294 | 392 | 332 | 603 | 206 | | 231 | 260 | 390 | 434 | NS | | 165 | | NS |
| CV (%) | 17 | 11 | 25 | 12 | 22 | 31 | | 10 | | 13 | 17 | 42 | | 12 | | 26 |

Western Regional Lentil Variety Evaluation

The Western Regional lentil variety trial was conducted at two sites (Havre and Richland). The trial consisted of 20 entries, three commercially available and 17 advanced breeding lines from the USDA-ARS Grain Legume Genetics and Physiology Program in Pullman, Washington and North Dakota State University. The average yields of lentil were 2078 lb/ac at Havre and 1045 lb/ac at Richland (Tables 28-29). The entries varied in their test weight, TKW, height and flowering date at Havre (Table 28).

Table 28. Western Regional Lentil Variety Evaluation – Havre, MT in 2016

| Variety/lines | Grain Yield (lb/ac) 13% Moisture | Number of days to flower | Height (cm) | TKW (g/1000 seeds) | Test wt (lb/bu) |
|-----------------|-------------------------------------|-----------------------------|-------------------|-----------------------|--------------------|
| Avondale | 2517 | 52 | 32 | 47.0 | 62.05 |
| Eston | 2027 | 51 | 26 | 30.3 | 64.18 |
| LC01602273E | 2370 | 55 | 28 | 35.3 | 64.03 |
| LC08600005E | 2257 | 53 | 30 | 42.3 | 63.83 |
| LC08600113P | 2438 | 50 | 28 | 43.5 | 63.75 |
| LC08600116P | 2297 | 53 | 29 | 47.1 | 63.83 |
| LC09600054E | 2562 | 50 | 29 | 39.7 | 63.88 |
| LC09600066E | 2496 | 49 | 28 | 35.5 | 64.20 |
| LC10600494P | 2110 | 51 | 27 | 40.2 | 64.35 |
| LC14600006P | 1700 | 50 | 23 | 39.6 | 64.87 |
| LC14600010P | 1239 | 52 | 27 | 38.5 | 66.30 |
| LC14600017P | 2042 | 52 | 28 | 41.6 | 64.53 |
| LC14600106L | 2063 | 50 | 34 | 73.5 | 59.95 |
| LC1660NZ003E | 1331 | 51 | 28 | 27.2 | 66.48 |
| NDL080187L | 2168 | 51 | 27 | 50.9 | 60.33 |
| NDL090185R | 2545 | 54 | 29 | 39.2 | 61.63 |
| NDL120423T | 1807 | 50 | 26 | 30.2 | 65.50 |
| NDL120432T | 1958 | 53 | 25 | 30.2 | 65.35 |
| NDL120480T | 1535 | 56 | 27 | 30.5 | 63.70 |
| Pardina | 2004 | 50 | 25 | 37.0 | 64.65 |
| Mean | 2078 | 52 | 28 | 39.0 | 63.95 |
| P-value | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| LSD | 265 | 1.1 | 3 | 1.9 | 0.42 |
| C.V. (%) | 9.04 | 1.54 | 7.59 | 3.46 | 0.47 |

Table 29. Western Regional Lentil Variety Evaluation – Richland, MT in 2016

| Variety/lines | Grain Yield (lb/ac) 13% Moisture | Number of days to flower | Height (cm) | TKW (g/1000 seeds) | Test wt (lb/bu) |
|-----------------|-------------------------------------|-----------------------------|----------------|-----------------------|--------------------|
| Avondale | 1213 | | 38 | | 59.35 |
| Eston | 1389 | | 44 | | 60.60 |
| LC01602273E | 1290 | | 42 | | 62.07 |
| LC08600005E | 1348 | | 44 | | 58.68 |
| LC08600113P | 901 | | 42 | | 62.53 |
| LC08600116P | 1013 | | 45 | | 62.33 |
| LC09600054E | 1411 | | 40 | | 62.68 |
| LC09600066E | 1198 | | 39 | | 60.65 |
| LC10600494P | 813 | | 41 | | 57.90 |
| LC14600006P | 562 | | 43 | | 61.90 |
| LC14600010P | 631 | | 43 | | 62.25 |
| LC14600017P | 873 | | 43 | | 62.27 |
| LC14600106L | 929 | | 40 | | 56.30 |
| LC1660NZ003E | 697 | | 40 | | 61.50 |
| NDL080187L | 1031 | | 39 | | 56.00 |
| NDL090185R | 1260 | | 46 | | 59.03 |
| NDL120423T | 1098 | | 43 | | 64.25 |
| NDL120432T | 1071 | | 41 | | 63.13 |
| NDL120480T | 1251 | | 40 | | 63.00 |
| Pardina | 394 | | 37 | | 59.35 |
| <i>Mean</i> | 1045 | | 42 | | 60.91 |
| <i>P-value</i> | <0.0007 | | 0.5726 | | <0.0001 |
| <i>LSD</i> | 417 | | <i>Ns</i> | | 1.53 |
| <i>C.V. (%)</i> | 28.24 | | 14.00 | | 1.79 |

Chickpea

Statewide Chickpea Variety Evaluation

The statewide chickpea variety evaluation includes seven commercial varieties and one advanced lines and carried out in eight environments. The statewide chickpea variety evaluation was not planted at Bozeman site due to deer problem. The mean grain yields were 3963 Conrad, 3844 lb/ac Huntley irrigated, 3160 lb/ac Sidney dryland, 1032 lb/ac Sidney irrigated and 136 lb/ac at Richland site (Table 31).

We evaluated the seed size of chickpea varieties from statewide chickpea variety trial harvested from Sidney dryland using sieve with 8.7 mm diameter opening. The results are shown in Table 32. The variety Sierra has the highest percentage of grain size greater than 8.7 mm diameter compared with the others. The variety Sawyer and the new experimental line (BGC090017) have substantial percentage of seeds with seed size greater than 8.7 mm diameter and ranked second and third following Sierra, respectively. The seed sizes for the variety Myles (desi type) were all less than 8.7 mm diameter.

Table 30. Chickpea Variety Characteristics

| Variety/lines | Type |
|---------------|-------------------|
| CA0790BO043C | Large Café Kabul |
| CA0890BO429C | Large Café Kabul |
| CA0790BO547C | Large Café Kabul |
| CA0790BO549C | Large Café Kabul |
| CA0790BO733C | Large Café Kabuli |
| Dwellely | Large Café Kabul |
| Sawyer | Large Café Kabul |
| CDC Alma | Med/Large Kabuli |
| CDC Frontier | Large Kabuli |
| CDC Orion | Large Kabuli |
| Myles | Desi |

Table 31. Statewide Chickpea Variety Evaluation – Yield (lb/ac) in 2016

| Variety/lines | Conrad | Corvallis [‡] (Irri.) | Huntley [†] (Dryland) | Huntley (Irri.) | Moccasin* | Richland [±] | Sidney (dry) | Sidney (Irri.) |
|-------------------|-------------------|-----------------------------------|-----------------------------------|--------------------|-----------|-----------------------|-----------------|-------------------|
| BGC090017 | 4538 | | | 5007 | | 142 | 3427 | 1855 |
| CDC Alma | 3172 | | | 3012 | | 186 | 3302 | 477 |
| CDC Frontier | 5463 | | | 4592 | | 277 | 4040 | 1040 |
| CDC Leader | 4741 | | | 3570 | | 155 | 3926 | 1609 |
| CDC Orion | 3662 | | | 3494 | | 135 | 2120 | 831 |
| Myles | 3306 | | | 3379 | | 87 | 3677 | 1504 |
| Sawyer | 3611 | | | 3801 | | 116 | 2392 | 482 |
| Sierra | 3215 | | | 4190 | | 10 | 2463 | 347 |
| Mean | 3963 | | | 3844 | | 136 | 3160 | 1032 |
| P-Value | <0.0001 | | | 0.2816 | | <0.0001 | 0.0052 | <0.0001 |
| LSD (0.05) | 754 | | | <i>Ns</i> | | 68 | 1022 | 332 |
| CV (%) | 13.45 | | | 29.50 | | 35.31 | 22.89 | 22.77 |

[‡]Data was not ready for this report due to late harvest; [†]hail damage; *Pre-harvested by mistake. [±]Yield from Richland was extremely low due to disease, cool season during grain filling and deer damage.

Table 32. Mean percent of seed size of chickpea varieties with seed size greater than 8.7 mm diameter. The samples were collected from statewide chickpea variety evaluation trial, Sidney dryland, MT, 2016.

| Variety | Percent of seed size > 8.7 mm (22/64) diameter |
|--------------|--|
| BGC090017 | 75.4 |
| CDC Alma | 59.7 |
| CDC Frontier | 49.3 |
| CDC Leader | 64.4 |
| CDC Orion | 48.1 |
| Myles | 0.0 |
| Sawyer | 77.6 |
| Sierra | 86.3 |
| Mean | 56.9 |
| P-value | <0.0001 |
| LSD (0.05) | 10.8 |
| CV | 13.49 |

Multi-Year and Multi-Location Statewide Chickpea Variety Evaluation Summary

Table 33. Multi-Year and Multi-Location Statewide Chickpea Variety Evaluations –
2011– 2016 - Grain Yield Summary (lb/ac)

| Variety | Bozeman | | | | | Conrad | | | | |
|-------------------|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|-------------|-------------|
| | 2012 | 2013 | 2014 | 2015 | 2016 | 2012 | 2013 | 2014 | 2015 | 2016 |
| BGC08008M | | | | | | | | | | |
| BGC08009M | | | | | | | | | | |
| BGC090016 | | | | | | | | | | |
| BGC090023 | | | | | | | | | | |
| CA0790B0042C | | | | | | | | | | |
| CA0790B0547C | | | | | | | | | | |
| CA0790B0549C | | | | | | | | | | |
| CAO890B0427C | | | | | | | | | | |
| CDC Alma | 828 | 1396 | 1458 | | | 1946 | 3250 | 214 | | 3172 |
| CDC Frontier | 875 | 1594 | | | | 2103 | 2488 | | | 5463 |
| CDC Orion | 852 | 1574 | 1923 | | | 2090 | 3008 | 118 | | 3662 |
| Myles | 994 | 1233 | 1821 | | | 1626 | 1294 | 476 | | 3306 |
| <i>Mean*</i> | 796 | 1449 | 1734 | | | 1750 | 2510 | 269 | | 3963 |
| <i>LSD (0.05)</i> | 136 | 145 | <i>NS</i> | | | 575 | 412 | 189 | | 754 |
| <i>CV (%)</i> | 10 | 6 | 24 | | | 18 | 10 | 43 | | 13 |
| Variety | Huntley (irri.) | | | | | Moccasin | | | | |
| | 2012 | 2013 | 2014 | 2015 | 2016 | 2012 | 2013 | 2014 | 2015 | 2016 |
| BGC08008M | | | | | | | 1810 | | | |
| BGC08009M | | | | | | | 2084 | | | |
| BGC090016 | | | | | | | 1719 | | | |
| BGC090023 | | | | | | | 1812 | | | |
| CA0790B0042C | | | | | | 981 | 1600 | | | |
| CA0790B0547C | | | | | | | 1551 | | | |
| CA0790B0549C | | | | | | | 1700 | | | |
| CAO890B0427C | | | | | | | 1807 | | | |
| CDC Alma | 3056 | 1467 | 3082 | | 3012 | 919 | 1533 | 1036 | | |
| CDC Frontier | 2745 | 1874 | | 2970 | 4592 | 605 | 1420 | 1020 | 1337 | |
| CDC Orion | 3167 | 1521 | 3598 | 3191 | 3494 | 1619 | 1806 | 999 | 1477 | |
| Myles | 2668 | 2411 | 2979 | 2474 | 3379 | 964 | 1392 | 1566 | 1164 | |
| <i>Mean*</i> | 2595 | 1818 | 3219 | 2707 | 3844 | 830 | 1623 | 871 | 1155 | |
| <i>LSD (0.05)</i> | 526 | <i>NS</i> | 510 | 459 | <i>NS</i> | 304 | 425 | 307 | <i>NS</i> | |
| <i>CV (%)</i> | 12 | 35 | 9 | 11 | 29 | 19 | 18 | 24 | 21 | |

*Trial means include other varieties as indicated in the previous table (Table 31).

-----Continued -----

Table 34. Multi-Year and Multi-Location Statewide Chickpea Variety Evaluations –
 2012– 2016 - Grain Yield Summary (lb/ac) -----Continued -----

| Variety | Corvallis (irri.) [‡] | | | | | Richland | | | | |
|-------------------|--------------------------------|------|-------------|------|------|-------------|-------------|------------|-------------|--------------|
| | 2012 | 2013 | 2014 | 2015 | 2016 | 2012 | 2013 | 2014 | 2015 | 2016 |
| BGC08008M | | | | | | | 2339 | | | |
| BGC08009M | | | | | | | 3902 | | | |
| BGC090016 | | | | | | | 2019 | | | |
| BGC090023 | | | | | | | 2619 | | | |
| CA0790B0042C | 1801 | | | | | 201 | 506 | | | |
| CA0790B0547C | | | | | | | 1617 | | | |
| CA0790B0549C | | | | | | | 1227 | | | |
| CA0890B0427C | 1746 | | | | | | 867 | | | |
| CDC Alma | 1771 | | 734 | | | 1467 | 2763 | 599 | | 186 |
| CDC Frontier | 1971 | | | | | 2488 | 3529 | 838 | 2020 | 277 |
| CDC Orion | | | 934 | | | 1907 | 2930 | 416 | 1958 | 135 |
| Myles | 1693 | | 1155 | | | 1588 | 2641 | 922 | 1027 | 87 |
| <i>Mean*</i> | 1678 | | 1087 | | | 1175 | 2363 | 459 | 1619 | 137 |
| <i>LSD (0.05)</i> | NS | | NS | | | 577 | 784 | 245 | 85 | 68 |
| <i>CV (%)</i> | 22 | | 43 | | | 29 | 23 | 37 | 11 | 35.32 |

[‡]Data was not ready for this report;

Western Regional Chickpea Variety Evaluation

The Western Regional chickpea variety evaluation trial consisted of six advanced lines and two commercial varieties (Table 35). The trial was planted at Corvallis and Richland. But the trial was totally damaged at Richland site due to disease and deer problem (deer ate the pods). Therefore, the yield was variable for the different replications for a variety and was extremely low (Table 35). This problem should be taken into account while interpreting the results from this site. CDC Frontier yielded higher than the other entries at Richland site. The results from Corvallis was not ready for this report.

Table 35. Western Regional Chickpea Variety Evaluation at Corvallis Moccasin and Richland in 2016

| Variety/lines | Corvallis* | | | | Richland [‡] | | | |
|-------------------|---------------------------------------|-----------------------|--------------------|----------------|---------------------------------------|-----------------------|---------------------------------|----------------|
| | Grain Yield (lb/ac) @ 13% moisture | TKW (g/1000 seeds) | Test wt (lb/bu) | Height (cm) | Grain Yield (lb/ac) @ 13% moisture | TKW (g/1000 seeds) | Test wt (lb/bu) [±] | Height (cm) |
| CA04900843C | | | | | 32 | | | |
| CA079080034C | | | | | 12 | | | |
| CA079080043C | | | | | 100 | | | |
| CA079080547C | | | | | 9 | | | |
| CA089080429C | | | | | 50 | | | |
| CA089080531C | | | | | 38 | | | |
| CDC Frontier | | | | | 244 | | | |
| Myles | | | | | 230 | | | |
| <i>Mean</i> | | | | | | | | |
| <i>P-value</i> | | | | | | | | |
| <i>LSD (0.05)</i> | | | | | | | | |
| <i>C. V. (%)</i> | | | | | | | | |

*Data was not ready for this report. [‡]Yield was extremely low and highly variable between replications for a given variety to do statistics. This was due to disease and serious deer damage. In fact we have been told by one of the producer not to harvest it because of poor pods per plant. We presented this data on this table just to show the performance of the varieties if someone is interested in to get information under such circumstances. [±]The amount of samples were too small to measure test weight.

FUTURE PLANS

The contribution of dry pea, lentil and chickpea for cropping systems sustainability and for the State's economy is substantial. In addition, the national and international demand for these crops as source of healthy food is considerable. Therefore, this project will be continued to evaluate statewide and western regional spring dry pea, lentil and chickpea varieties and experimental lines across Montana to generate information that can help to make informed decision. In addition, research is needed to develop best management practices to increase yield and improve quality of these crops. These include but not limited to nutrient management, weed control both for conventional and organic pulse growers and enhancing biological nitrogen fixation besides developing varieties. We hope research fund, support and collaboration among researchers will continue to achieve the objective.

Note: The results and summary mentioned in this annual report are for **informational purposes only**. Inclusion and or exclusion of any commercial variety in this summary does not constitute a recommendation by MSU-MAES or EARC.

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